COMPUTERWORLD

EXTRA

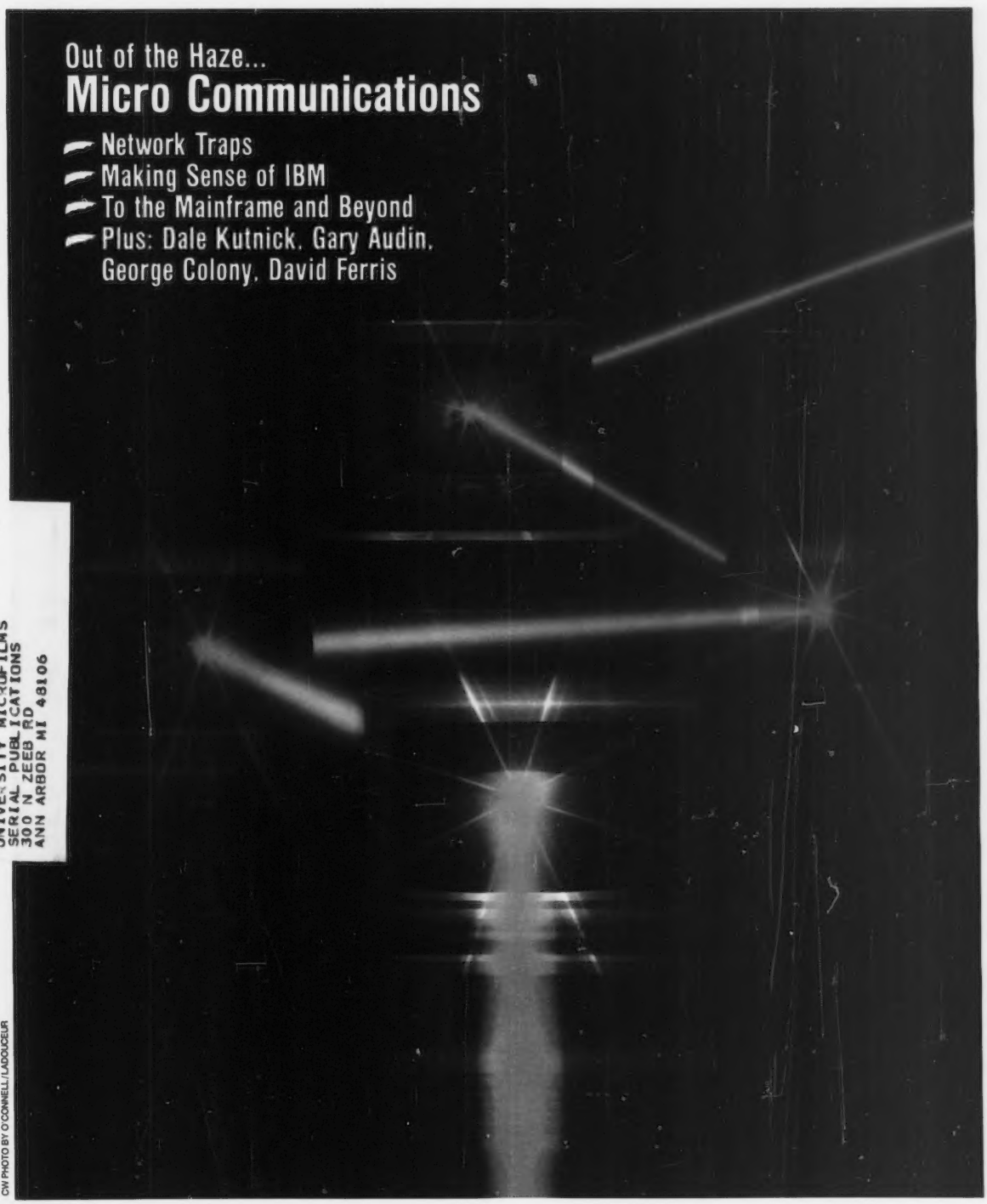
VOLUME 19, NUMBER 38A

SEPTEMBER 25, 1985

Out of the Haze...

Micro Communications

- Network Traps
- Making Sense of IBM
- To the Mainframe and Beyond
- Plus: Dale Kutnick, Gary Audin, George Colony, David Ferris



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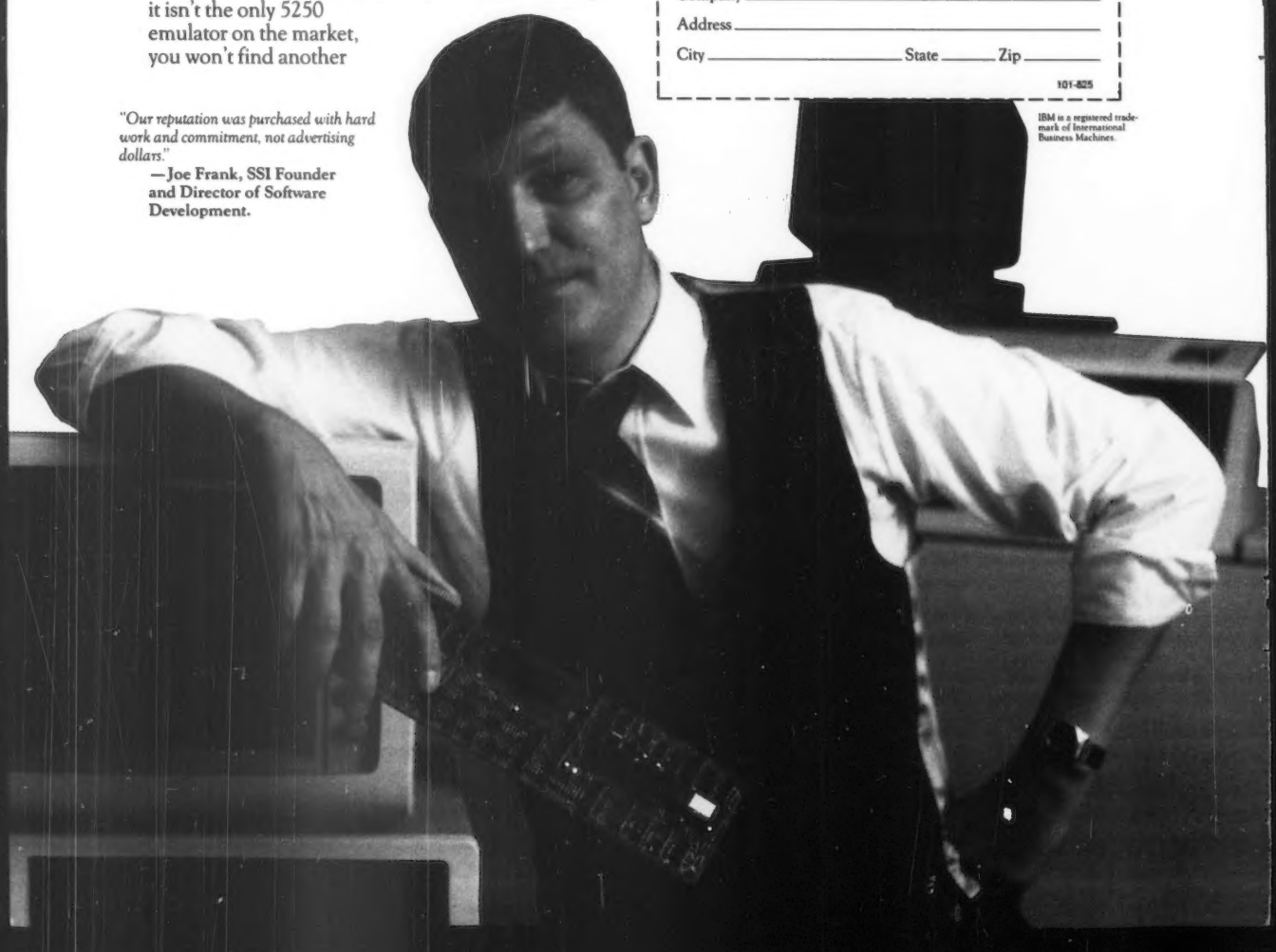

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Contents

Departments

Editorial/2
Comment/2
User Views/40
Market Trends/41
Vendor Views/43

War stories from the network front 6
By John Dounis and Sharon Efroymson
Experienced users report from the trenches on how not to go through what they did.

Also: Beyond Band-Aids 12
By Stephen Thurston

IBM's grand scheme 13
By Eric Killorin and Paula Musich
You know the products. Here's the strategy.

Also: LU6.2 the new super link? 17
By John Doherty

On the road to the mainframe 18
By Gary Audin
You can get there from here.

Dialogue 22
By George Harrar
A user and a consultant — Joseph Brophy and George Colony.

Gearing software to networks 31
By David Lytel
The software runs, but how well?

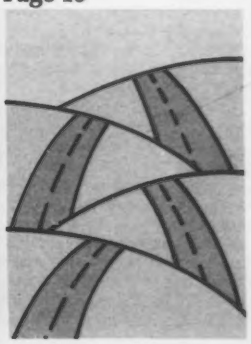
Gateways 35
By George Elgar
They go to the heart of micro-to-mainframe communications.

Security and integrity: They're in the hands of the CIO 46
By William de Gruchy
Whose data is it, anyway?

Page 6

Page 13

Page 18



Editorial

In search of the right connections

George Harrar

Dancing on the edge of technology takes a keen eye and sure feet. Many micro users have fallen trying to get to the mainframe or even just to another micro nearby.

Inside this issue of *Extra*, you can learn from the sure steps as well as the missteps of the "early adopters," that curious breed of user who takes a chance on the new. These "leading edge" companies are trumpeted in the press for their willingness to be a beta test site or a first user.

In "War Stories from the Network Front," writers John Dounis and Sharon Efroymson walk along this bleeding edge of personal computer networks and find that users stay loyal to the solution and the vendor they've chosen, even after many a fall.

In the more conservative offices of business America, millions of micros still talk to no one but their owners, the end users. But author Tom Cross declares, "The personal, stand-alone computer has only about four or five years left in its usefulness to the large organization. Users of stand-alone micros will ultimately work in a vacuum."

Besides the technological spills awaiting early adopters of personal computer networks, there are vendor claims to sort through. Network sellers like to emphasize the theoretical upper limit of users on a system — in one case, 160. But in field use, it turns out, that same system typically supports five to 20 users.

Writer Eric Killorin points out that IBM rates its Cluster Program, which competes with personal computer networks, as theoretically supporting 64 users but suggests 20 to 25 users in its marketing pitches. Killorin recommends planning on no more than six users so the system doesn't degrade seriously during I/O-intensive sessions.

Among the other provocative stories in this issue is Dale Kutnick's "Comment" column below, a hopeful view of the four stages to complete integration (we're still two steps away). He pins much of his hope on LU6.2. Later on, author John Doherty explains why this IBM protocol is worthy of the sudden attention it is attracting.

Extra will be coming to you again Dec. 4 on a different theme — products, strategies and alternatives in the IBM world.

For now, read on about micro communications, one of this year's hottest topics. And if you have your own comment, drop us a line.

ILLUSTRATION BY JON MCINTOSH

Comment

Two steps from utopia

By Dale Kutnick

The next major phase of the microcomputer revolution will be the cooperative or logical integration of these powerful desktop devices into mainstream information processing environments. This movement will be a four-stage evolution, with many promises and false starts. It will demand a total systems solution that today exists only on paper.

Just a few micro-to-mainframe vendors will adopt this perspective successfully and be able to compete against the large systems hardware and software vendors; the rest will become "niche players," primarily supplying multivendor environments.

The first stage of the logical integration of micros — simple communications links — is well under way with the proliferation of 300 and 1,200 bit/sec. modems, and more recently, 2,400 bit/sec. models.

While this stage has given users rudimentary connections, it has definitely impeded the progress of integrated networks. As individual users attempt to solve their own communications problems, their investment in and commitment to limited solutions take away the impetus for integrated corporatewide networks, which by nature require a top-down strategy.

Stage two is still in its infancy. In this phase, personal computers are attached to some kind of network and can load data from other network resources into their applications. While this loading is still cumbersome and often requires two, three or even four steps, protocol and format conversion exists, as does limited context switching between programs (loading a CICS file into a Lotus spreadsheet).

In stage three, whose development is occurring in parallel with stage two, micros share the same applications/facilities software with minis and/or mainframes. This sharing enables very smooth context switching, but the network software is not yet sophisticated enough to manage defaults and loading from one program to another.

Stage four will bring true cooperative processing — the ability for two or more intelligent devices to share resources and to load-balance applications processing efficiently and transparently between their users. The multimegabytes of memory and high-speed processors required to support these transactions are available now, but the software is far from ready.

In the future, personal computer users requiring information to fill in data base or spreadsheet application programs will simply request that information (using a familiar query facility) as though it were resident on a local disk. If it is not, the personal computer applications program will automatically default to a network program that will initiate a search in the next processor level (a file server, minicomputer or mainframe).

The network software will take care of security, logging, audit trails and so on and then oversee the delivery of the information in its appropriate form to the personal computer. The end user will be unaware that this complex process has taken place. Undoubtedly this configuration will be slow at first.

This "applications architecture" is quite analogous to distributing a large, homogeneous computer system — which has long been the promise of local-area networks. But the current network management, information delivery and application software is, in most cases, still two levels away from this utopia. It is slowly, painfully evolving.

During the past three years, the haphazard and uneducated buying of micros — personal computer anarchy — has outstripped vendors' ability to develop appropriate software. Constantly changing operating environments and applications software exacerbate the problem. Rather than buying now, users are awaiting true solutions, which has contributed to the current industry malaise.

In general, the popular application software packages are used primarily in stand-alone mode. Moreover, most communications programs are simply messengers (stage two in the evolutionary hierarchy), not true network

Comment

software that integrates applications. They require users to suspend their personal computer applications and to sign on to the mainframe or mini. The users then must have a good idea of where the desired information is located, what application contains it and how to extract it. This process can be cumbersome even for experienced users, and it explains why many professionals have been reluctant to embrace micro-to-mainframe links.

Some software, hardware and local-area network vendors are taking different approaches in beginning to address these issues. Mainframe software suppliers such as Oracle, Information Builders and Mathematica have put either full implementations or subsets of their data bases on the IBM Personal Computer.

IBM's LU6.2 protocol — which enables intelligent file transfer between distributed CPUs — is a good example of this new "logical" network software. It will form the basic link for IBM's upcoming token-ring network and for application and facilities interchanges between processors on an SNA network. But implementation of LU6.2 has been painfully slow.

Minicomputer vendors such as DEC and DG support their office automation programs (All-In-One and CEO, respectively) on both their minis and their supermicros, but the latter are generally too expensive for the average commercial user.

The local-area network software vendors, such as 3Com, Ungermann-Bass, Novell, Nestar Systems and Banyan have taken a different approach, using higher level local-area network software (typically "atop" Ethernet) and sophisticated file servers. Their network software efforts aim toward more virtual network access for personal computer users.

Not surprisingly, network software companies are one of the few groups that have managed significant growth during the 1985 computer industry recession. Still, their inability to control the higher level "applications environment" dominated by Cullinet, Applied Data Research, Cincom, IBM and so on will necessitate closer ties with those vendors if they are to move successfully to the next stage.

There are many issues to be resolved in the move toward cooperative, logically linked software. Transparency, information management and control, information delivery, application/facilities compatibility and security must all be addressed before this phase can become a natural extension for microcomputer users.

The message is now becoming clear: Independent software and hardware vendors that do not develop their products to link cooperatively with software running on mainframes and minicomputers will increasingly be locked out of the corporate world.

Dale Kutnick is an independent consultant based in Wayland, Mass., specializing in strategic planning and technical/market analysis. Formerly, Kutnick was research director and a principal of The Yankee Group.

Of things that don't quite work

By David Ferris

It's one thing for a DP manager to plug in an isolated personal computer in a senior manager's office so he can do spreadsheet analysis or compose documents with a word processing package. It's another matter entirely to turn the micros into full-fledged executive workstations that maximize work efficiency and put end users in touch with the information they need.

A key difference is the need for the personal computer to communicate with in-house computing facilities and with external resources. The workstation should represent a powerful, comprehensive set of support tools without placing too many of its own demands on the executive's time.

Eventually, micro-based executive workstations will incorporate many of the promised new technologies, ranging from advanced telephony and graphics to artificial intelligence. But the realities of implementing a real, live, functioning executive workstation today, next week or next year require more down-to-earth planning.

To minimize the risk of failure in an industry afloat in things that don't quite work yet, it's important to stick to relatively tried-and-true personal computer and 3270-style components. Start by implementing a conventional menu-driven front end which includes standard housekeeping functions. Then it should provide access to two classes of applications: generic packages that must be tailored by the user and those customized to specific in-house requirements.

Avoid the temptation to offer exotic generic applications just because they're available. It's probably true that, come 1990, many people will use project management and linear programming packages. But unless the company is already familiar with them, it's best to keep to mainstream end-user tools because, in practice, any others are likely to be ignored.

Furthermore, when defining the applications, remember that one of the executive's most important roles is to communicate ideas. As an analyzer and planner who then delegates tasks,

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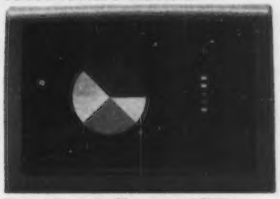

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Comment

the executive needs to receive, process and pass information along. Consider providing several of the following:

Electronic mail greatly facilitates communication with the executive's colleagues. The store-and-forward capability is most often based on either a package such as Applied Data Research, Inc.'s E-Mail or IBM's Professional Office System on a corporate mainframe or on a third-party facility such as The Source or Dialcom.

Word processing, at least for simple note-taking, should be personal computer- or mini-based via terminal emulation. In time, many executives will achieve a high level of keyboard fluency and may choose to enter document text as they compose it.

Spreadsheet analysis: The best choices are personal computer-based, such as Lotus' 1-2-3. Terminal emulation to access mainframe-based packages such as Oxford Software Corp.'s Maxicalc is much less effective for this type of processing.

Automated Rolodex — user-friendly list management packages, such as Software Publishing Corp.'s PFS:File, used for storing names and addresses, major capital expenditures, personnel resources or other types of information for quick reference.

Proprietary data base services, such as Nexis and Dow Jones, provide access to financial, investment, economic and general news.

Corporate data downloading: Unfortunately, implementing downloading is awkward, particularly if you need an ad hoc, general-purpose facility. Informatics General Corp.'s Microanswer appears to be the best general-purpose solution.

The custom, in-house applications should be accessed from the front-end menu in exactly the same way as the generic applications. They fall into two general categories. Mainframe report menus are tied to preformatted reports containing operational, planning and personnel data. These services are available to the workstation user via terminal emulation.

Personal computer-based programs also offer a selection of reports which can best be written with application generators such as Ashton-Tate's Dbase III, Information Builders, Inc.'s PC/Focus or the programming languages embedded within Lotus' 1-2-3 and Symphony. It is usually unwise to turn to languages such as Basic or Cobol as implementation vehicles.

Personal computer-based programs are generally stand-alone. A 2,000-line program is not unusual. Some are sophisticated enough to perform a simple level of networking: A Symphony application can retrieve information from external data bases in a process transparent to the user.

The final result is a powerful tool for the executive, who can access information quickly and spend less time getting it and more time putting it to good use. The spreadsheet facilities and access to remote data bases improve the quality of decisions; the electronic mail speeds up communication time with colleagues; and the word processing facilities can, in the hands of a keyboard-fluent user, greatly enhance the quality of documents and speeches.

As simple as this workstation sounds, successful implementation is still far from simple. Microcomputer batch languages are much too rudimentary. What's needed is a good language in which to define menu screens, menu-to-menu control flow, interprogram communications and external communications.

For a start, the command language available with MS-DOS and PC-DOS is inadequate: People sometimes have been forced to program the entire front end. End users often have to type confusing key sequences when accessing mainframe applications because of the difference between most micro and 3270-family keyboards.

A deeper problem is the variety of different application languages that end users must learn. Electronic mail packages have one way of doing things, Dow Jones another, 1-2-3 another and so on. Here, the micro offers better potential than unintelligent terminals because it can provide a more consistent cross-application interface as an executive workstation.

So our personal computer-based executive workstation approach is deliberately conservative. There's no talk of local-area networks, Disoss or paperless offices. We don't even include presentation graphics, the use of which is best delegated to the executive's clerical staff. Our workstation uses conventional hardware, typically an IBM Personal Computer XT, a Compaq or equivalent, with a draft- or letter-quality printer.

A critic might characterize this setup as merely stringing together unimaginative applications by means of a top-end menu, with little attempt at integration. I would agree. Our technological caution stems from the fact that the infrastructure required to offer better integration is still being developed and debugged. Personal computer-based executive workstations are now practical and useful, but those implementing them should try to minimize costly experimentation with the unproven.

David Ferris is chairman of San Francisco-based Ferrin Corp., consultants specializing in the integration and support of personal computers and end-user computing tools.

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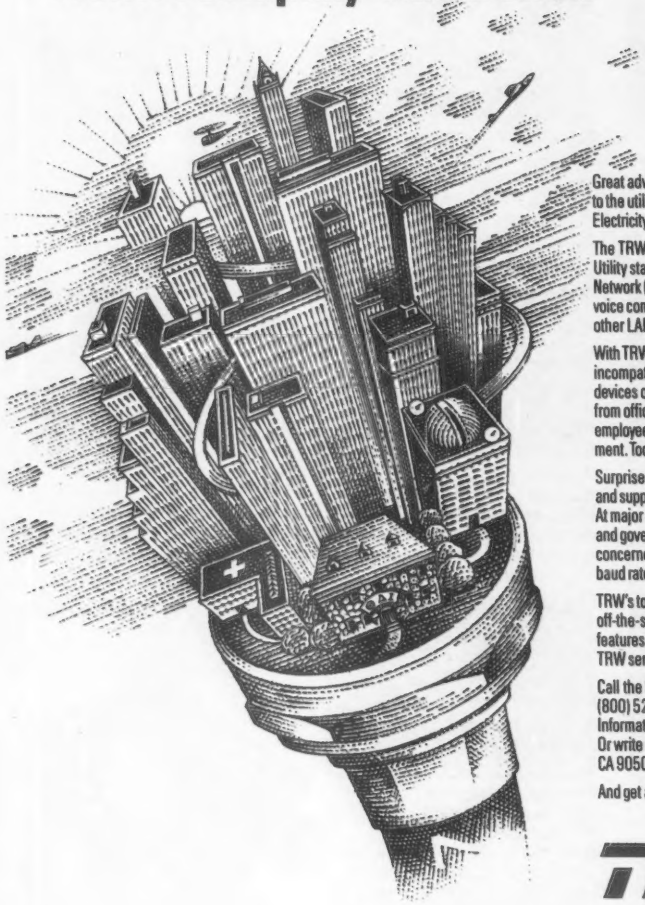

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Comment

A call to arms

By Thomas Cross

To wait is often the best policy — and certainly it has turned out to be so for some DP departments in managing personal computers. But now the challenge of interconnecting micros, among other issues, forces the MIS director to make a move.

Personal computer users have "had it their way" for the last five years. They achieved independence by taking control of their own applications, proving to DP that they could accomplish a great deal on their own.

But the question remains: Who should direct the growth and usage of personal computers and toward what purpose?

Each department within the company has its own view of the microcomputer's purpose. Top management seeks to determine the "real" benefit of linking personal computers together. The MIS/DP department favors intelligent terminals for interactive programming. The office automation department seeks solutions for office tasks on a departmental level. Farther afield, the information center uses personal computers as massive information repositories.

Each view implies a different approach to designing and implementing personal computer networks, and at present, both end users and DP management are demonstrating myopia in their consideration of network installation. If the micro is seen as a window to an on-line world that links ideas, decisions and policies, then the network proposals emphasize extensive disk storage for holding large amounts of data. If the micro is viewed as a management communications "power tool," the inclusion of X.25 gateways and protocol conversion mechanisms are presented as critical.

Ironically, the personal computer's greatest virtue, personal processing, can be its greatest limitation. Too often the person equipped with a stand-alone micro works in isolation. The answers and insights provided by the computer never get beyond that person's office.

But the stand-alone personal computer has only about four or five years left in its usefulness to the large organization. Users of stand-alone micros will ultimately work in a vacuum.

At this point, there is a critical mass of knowledgeable stand-alone micro users. Now they want to share their information and their expertise. Personal computer networking is about to explode.

The future lies in high-speed networks that integrate voice and data with video (such as the IBM 7730 PC-XT Video Conferencing System) and blur the distinctions between the telephone and the computer.

But networks add new dimensions to the management problem already sparked by personal computers:

■ Data security — End users are concerned about security, of course, but not to the point of wanting to enter 10 different password levels.

■ Data integrity — Who gets to change what and when? Bureaucracy could not have found a better home.

■ Capabilities — Graphics, video and other image technologies throw a wrench into efforts to make terminal emulation work.

■ Validity — Was the data sent and received accurately? Did you get a "yes" when you should have gotten a "no"?

■ Devices — Someone needs to have the last word on where the extra disk drive went to and who is supposed to fix the printer.

■ Applications — Will the application that operates adequately today still operate tomorrow when Unix or another new operating system is used?

■ Systems failure — Lost any data lately to static, power surges or pushing the wrong button? Has anyone forgotten to do a backup before the head crashed?

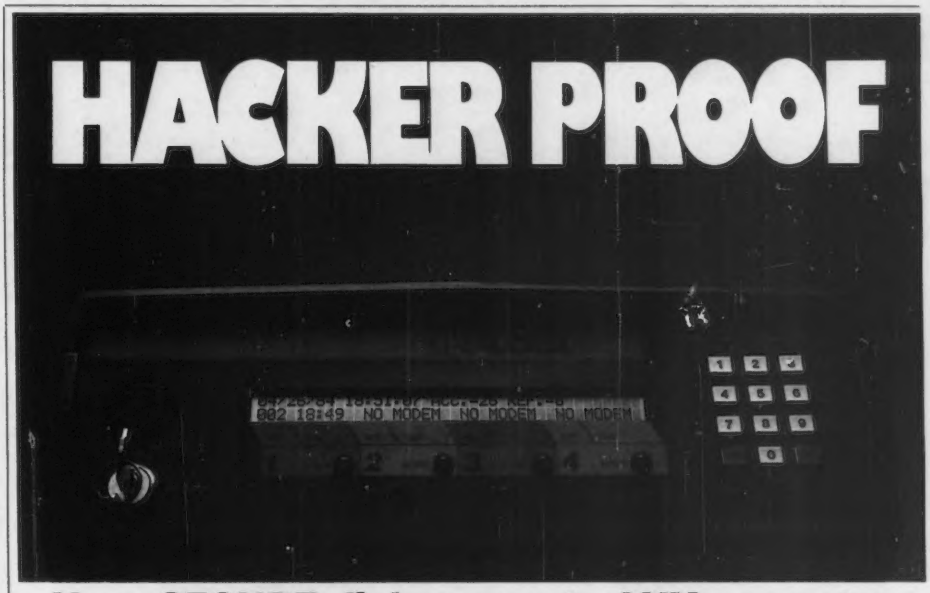
■ Management and control — Who is really in control? Now that end users are actively involved in day-to-day data processing, human communications need to be well maintained, too.

It's time for the MIS director to seize the moment — to take charge of the situation and direct long-term strategy. The personal computer user needs help.

By the same token, DP/MIS has no mission without the end user. The end user is looking for long-term solutions more than quick and easy fixes, so opportunities for developing alliances exist today more than ever before.

But in order for that bargaining to begin, DP/MIS and the end user must approach the table on a peer-to-peer basis. Corporate long-term strategies dictate an end to hostilities and the enforcement of a well-earned truce.

Thomas Cross is managing director of Cross Information Co., Boulder, Colo., which develops telecommunications services and presents symposia on information technology. He has authored several books and articles, most recently Networking Personal Computers in Organizations *(Dow Jones-Irwin), co-authored by James Weidlien, and* Intelligent Buildings and Information Systems Executive Report.



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EXTRA

War stories from the network front

By John Dounis
and Sharon Efroymson

In the battlefield known as micro networks, these users have lost, won, lost and won again. There are lessons here.

The corporate controller's office at Continental Grain Co., a multibillion-dollar international corporation, received a local-area network about two years ago. With a newly installed 3Com Corp. network, the controller can perform more in-depth financial analyses and produce more reports in a significantly shorter time.

"To consolidate information before we had the network, we walked floppies from machine to machine or shuffled it together on one IBM Personal Computer. With the network, we can consolidate without the footsteps and the shuffling," says Larry Stouder, Continental Grain's senior business technology specialist. Savings in time meant that actual output from the office — analyses and financial reports — sharply increased.

The network was the first in the company, and everyone loved it — until it crashed. Routine diagnostics failed to detect the problem, and after numerous attempts at repair, the authorized service representatives recommended by 3Com threw up their hands.

"I yelled and screamed," Stouder recalls. "They kept hitting us with charges and not solving the problem." The culprit turned out to be the file server, which Stouder finally had to fly from Continental's headquarters in New York to 3Com in California.

"We were back in service in about a week," Stouder says. "But a week for repairs in a controller's office is not too good." Repairs included restructuring the hard disk — unfortunate news for the department, which was backing up files on floppies. Prior to the crash, the department had shied away from investing in a tape backup system to keep costs down. After the experience of reconstructing the disk files from floppies, a tape backup seemed a necessity.

The network ran for six more

CW PHOTO BY O'CONNELL/LADOUCEUR

months without a hitch then crashed again. Because of an engineering flaw, a gasket had been left out of the server. Stouder endured another round with the service organization without result, then shipped the server off to California again for another week of repairs.

This time, the network ran without major problems for a year before the server was out again because of a motherboard problem. Back to California.

"By this point, the server had had three trips — first class — to California, and I'd had none," Stouder quips. "That bothered me."

War stories like this one are becoming a hallmark of the local-area network industry. Veteran network users like to recount them in detail to anyone considering installation, in an attempt to balance the puffery and promises of network vendors.

It is true that even the best installations have been plagued with all kinds of bugs — simply because there have been virtually no standards. Compatibility has been tenuous between networks and third-party software or peripherals, and vendors and dealers have had little real world experience supporting the networks they are selling.

Surprisingly enough, despite the war stories veteran users stay loyal to the network vendor of their choice.

Brand loyalty

Given the option, most say they would stick with the original vendor, especially as technological advances continue to increase the reliability of networks and as experience improves dealer support. Networks are basically serving the functions for which they were purchased, and in this light, can be considered successful.

Stouder, for example, has tried other networks by installing loaners in his office, including the IBM PC Network and Orchid Technologies, Inc. PC-Net, but he still favors 3Com. However, he has changed dealers to get better service and blames the original server problem on the vendor's use of an OEM.

Continental Grain plans to trade its current server for the newly announced 3Server, which will allow Stouder to upgrade to some of 3Com's not-yet-announced products. 3Com's upgrade policy provides a reasonable discount on the 3Server.

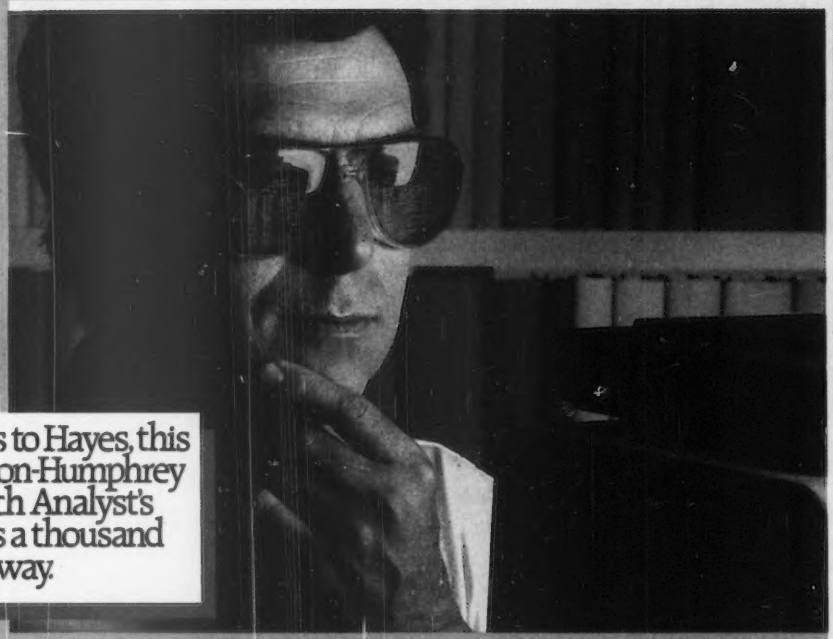
And the industry as a whole is gaining from the experiences of the early local-area network buyers. Some standards are evolving as the technology advances, and many users who held off on installation can now consider it more realistically.

New users can also take advantage of current network users' experience to avoid certain pitfalls. These suggestions include better ways to install and configure networks — what experienced users would have done if they knew then what they know now.

Stouder has specific advice for corporations: Don't use a dealer who focuses on retail as well as corporate trade. He notes, "When a dealer caters to retail, some of his services and policies are colored by it" — to the detriment of the corporation. Retail customers with small installations may be satisfied to have their systems repaired or replaced within a week, so the dealer may not be set up to handle the hour-by-hour demands of the corporate DP environment.

Some local-area network vendors are planning to offer a "warm standby," a secondary system that will come online when a primary system fails. For years mainframe in-

Mr. John B. Moore, Jr., First Vice President, Financial Services Research, Robinson-Humphrey, Atlanta, Georgia.



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stallations have relied on this option.

Also, certain standards are emerging. With the introduction of the PC Network and DOS 3.1, many network vendors will be emulating the IBM and Microsoft Corp. standards in their systems.

But this era has not yet arrived, and human communication difficulties complicate already complex technical issues. For example, when a vendor says that the desired software package will run on a local-area network, many users interpret the statement to mean that the software will provide record-level lockout. The vendor may actually mean that the software will run on the network properly only as multiple single-user systems — in other words, file-level lockout.

Deceptive packaging

As a result of such ambiguous vendor statements, network users who have bought Ashton-Tate's Dbase III, for instance, expecting it to provide record-level security, have been disappointed. Two users attempting to write to a file simultaneously find later that their files were corrupted. Of course, there are data base packages that have been successfully adapted for use on networks, and some that have been written specifically for multiuser environments (See story page 31).

Lyle Anderson, a manager with the Office Business Systems Group at Peat, Marwick, Mitchell & Co. who specializes in micro- and minicomputer planning and implementation, has installed Novell, Inc., 3Com, the PC Network and Corvus Systems, Inc.'s Omnitalk for clients. Across the the board, Anderson finds that getting software to run on the network can be a problem because a lot of software packages write intermediate files during use.

"This can be a problem if you have two users using the same software, and both packages try to write the same intermediate file at the same time," he points out. Anderson's solution is to replicate the software on different directories for each user.

"Sometimes you have to trick the system into thinking you're still single-user by setting up paths on DOS. This takes a lot of trial and error." Adding another software user could mean repeating the replication process, and it will often take a generation of corrupted data to remind users to set up additional directories.

Copy protection and licensing is another consideration in setting up a network. Most software packages are not designed for networks, and legally a separate copy is required for each workstation. "It would be nice not to have copy protection on each diskette so that you could boot right off the network," Anderson says."We either get one copy per workstation or look for site licensing," which is an alternative many vendors of popular software packages are now providing as a compromise.

In a recent installation of the PC Network, Anderson ran into difficulties using non-IBM software and third-party equipment because Installation-Aid, the PC Network's installation program, will not run with third-party disks. "We needed to go with third-party and non-IBM software because IBM doesn't provide high-capacity disk drives for the Personal Computer and doesn't have a competitive spreadsheet product," he explains.

You're going to need a lot of support over the first six months to a year. You'll need a vendor who's reliable and close by.

"We've tried to get support for third-party products on IBM's hot-line number, and the answer I get is to talk to the hardware dealer who provided the product."

Third-party vendors were able to provide the answers, however, and Anderson says he is very pleased overall with the PC Network. He does suggest that when planning installation, users get in contact with the third-party vendors ahead of time to make sure they will provide support.

Growing with the vendor

Chuck Fielding, systems analyst at Jayco Management Co., a real estate developer in Houston, has watched the evolution and growth of his network over the past year from its initial six-node installation. Although firmly committed to Novell's Netware, Fielding has had his own challenging time with the network.

"I wish to thank Novell for making us a beta test site without our knowing about it," Fielding says wryly, referring to his recent experience with Novell's Advanced Netware. Fielding asked for the advanced version of Netware as soon as it was available because of Jayco's pressing need for a remote application.

While the local dealer did caution that there were still problems with the product, Fielding assumed they would crop up in the network's new remote features. He was therefore quite surprised to discover problems with basic interfacing commands such as FORMAT and LINK.

Furthermore, a popular word processing program that ran perfectly on the previous version caused the new network to crash when used with the

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spooler. Novell took a few months to debug Advanced Netware, but Fielding now has the upgrade, which he says is working fine.

Fielding's experience points to the hazards of working on the front lines of advancing technology. "We've always stayed on the edge of technology, as long as it's reasonable," he says. Reasonable, for Fielding, translates to a willingness to use a new product as long as it comes from a growth company he trusts. However, he doesn't recommend users take that risk unless they have an in-house technical staff for troubleshooting and support.

The process of fine-tuning

Back in March 1984, the same willingness motivated Jayco to be one of the first on the block to install a network. Managers needed a powerful multiuser data base application that would allow them to access up-to-date tenant and property information quickly, and the new personal computer-based network technology was the answer.

Jayco began with a six-node Gateway Communications, Inc. G-Net system, utilizing Novell's Netware/G software and an IBM Personal Computer XT as the designated file server. This linear CSMA/CD system is recommended for small installations. Three users were running a data base; the other three, spreadsheets and word processing.

The network ran into a few start-up snags, and installers ended up making adjustments to both hardware and software. First of all, the network was set up to share a single printer, but the printer unit was under heavy use, often grinding through a box of paper every 1½ hours. Fielding soon realized that the Okidata Corp. Microline 84 did not have the capacity to withstand the usage and upgraded to the vendor's Pacemark 2410.

Retail customers with small installations may be satisfied to have their systems repaired or replaced within a week, so some dealers are not set up to handle the hour-by-hour demands of the corporate DP environment.

Fielding says file-level lockout security, one of Novell's main assets, proves to be a nuisance in some instances. "If the person working with a file walked away without exiting from the application, another user would be prevented from accessing that file."

Also, he finds that new system administrators tend to have difficulty conceptualizing the definitions for public and private volumes and security rules. For example, if a program runs on the network, the rules for the program should be defined as shared/read-only. However, for each user, files should be defined as nonshared/read-write. This definition will allow all users to use the programs on the network and still protect files from being accessed and edited by other users. Fielding recommends that COMMAND.COM be installed in a public volume; otherwise, when exiting a program the user may have to reboot. "The manuals are somewhat vague about that," he observes.

Another problem is the training that is required for all network users. Fielding finds the nontechnical user would rather not be saddled with network commands in addition to DOS commands. He sidesteps the training issue by building front-end menus that control the desired network tasks for the users.

A 12-second wait

Even after these kinks were ironed out, there was still one overriding problem. "Our own users found the network too slow," Fielding explains. "Plus, we have a lot of investors who drop by our offices, and we like to show them our technology. A 12-second wait didn't look too good."

Because they realized that they were heading toward outgrowing the practical limits of the G-Net, Jayco's managers decided to upgrade to Novell's proprietary Netware/S Server, a Motorola, Inc. 68000-based token-passing star system, one year after the original installation.

Fielding found the same applications ran 30% faster on the new server. Benchmark tests showed that while accessing an 11K record through a data base application, the Read took 13 seconds on the six-node G-Net. It took 10 seconds on the Netware/S system. Even on a stand-alone Personal Computer XT without any network overhead, it only ran one second faster.

For Fielding, the potential for expandability is one of the true benefits of a network. Local-area networks don't require the steep initial investment of a minicomputer; a company can start with a small, serviceable network and invest more as time goes on.

Fielding does recommend that anyone installing a network make sure that the vendor has a good trade-in policy for upgrades. Other suggestions include:

Don't try to cut costs by mixing and matching hardware. Fielding says Anderson's bad experience with third-party peripherals is not isolated. "People mix all kinds of parts together without the experience to make it all work together," he says. "If a vendor suggests combining products, that's a danger sign. When you try to squeeze bucks, you get burned."

Check that your vendor has a good inventory to use as loaners when your network needs servicing. "You're going to need a lot of support over the first six months to a year," Fielding warns. "If you're buying a proprietary system and one piece goes down, it can take eight stations with it. You'll need a vendor who's reliable and close by so that you can be up and running by the next day."

Don't pay for anything until it works. "A lot of dealers don't know what they are doing. It is hard to understand a network until you've worked on one for a long time." Having been burnt a few times, Fielding has learned to dig in his heels. "I tell the vendor I'll hand the check over when the net works." He admits that one could only do this with a small system; the hardware investment for a large network would be so steep that no vendor would agree to these terms.

Bullish on networks

Another battle-scarred veteran, Laurie Antonell, is in charge of a larger installation. She is manager of micro networks for Merrill Lynch & Co. on Wall Street. The current network environment at Merrill Lynch, consisting of four Novell Netware/S networks that support 80-plus users, has been in place for about two years. The network is used for calendar programs and electronic mail, and the company has plans for new applications to take advantage of multiuser record-lockout capabilities.

In general, the S-systems provide Antonell with good response time for the 18 to 22 users connected to each of the three production systems. A fourth system is used to test new releases of software on the network and to perform regression tests during upgrades.

It is essential that new software be tested prior to migration onto a production network or when a new copy of the software is being installed. Antonell is currently planning a migration to the new Advanced Netware so that all of the independent networks can be linked together, enabling users to access all data simultaneously.

Cable installation

One of Antonell's recurring network problems is cable installation. For example, if someone moves to a different office, she doesn't want to reinstall that cable in the new location. The solution was to install cable within the wall, allowing it to be terminated with an outlet, and routing through a patch panel so users can switch a computer port onto an active line.

"Now I have cables hooked into each office. As people move, I just switch them to their new locations through the patch panel," she says. New users simply plug into an existing outlet. Installation of cable connectors continues to be a problem. When a connector on a cable severs, it is difficult to pinpoint the faulty connector.

Antonell advises that preventive maintenance be a standard practice. Simple maintenance such as backing up all the information on the disk, reformatting it to detect the newly damaged sectors and then restoring the files to the disk saves a lot of sleepless nights.

With six or seven disks in the system, the Merrill Lynch network has had three disk failures in two years. Much to Antonell's satisfaction, her dealer immediately supplied her with

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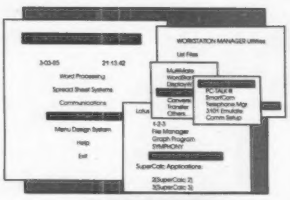

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replacement drives, so the network was up and running in 24 hours each time. Service support is high on Antonell's checklist for dealer qualifications. Her suggestions include the following:

■ Make sure your dealer maintains adequate inventory. "Go into the closet and see his supplies. The vendor should have at least one set of disk drives, all parts of a file server and a few workstation cards. Of course, if he services a hundred companies' networks, he should have a much larger inventory."

■ Check that the vendor employs technicians to handle problems specific to a local-area network. The technician should be able to tell, for example, if your problem is with the controller board, the memory board, the read-only memory chips or the disk drive.

■ Choose a vendor who knows how to set up the network for the expected load and for optimum performance, taking into account factors such as the file server's hashing and caching schema, the number of files that can be open at the same time, and disk and block sizes.

■ Designate a system administrator for every 25 users. Ten percent or less of an administrator's time will be spent adding and deleting new users and making sure that files are backed up and restored. The administrator should make sure that rules for public use are documented and should know how to add and delete software, how to add files in the proper directories and how to give people rights to it.

The system administrator is responsible for space management and for informing people to erase superfluous files but should not be responsible for doing so. The supervisor needs a data base of the serial numbers of the hardware and software and who has what file or directory access rights.

Wiser now

Richard Watson, chief of computer services at the U.S. Department of Commerce's Eastern Administrative Support Center, has installed a 35-node network from Network Development Corp., with an IBM Personal Computer as a server. He intends to upgrade to a Personal Computer AT but is waiting to see what other technologies emerge.

Watson tells his own war stories. The network ran very smoothly for the first four months — until it reached "some mystical point of activity." Then, as Watson describes, "It started showing symptoms like random failure — people would go to print a word processing file, and the file would disappear. The error interrupts were really nonstandard."

The department tried a number of solutions. "We suspected the word processor — or perhaps an incompatibility problem," Watson explains. But troubleshooting was of no avail.

"Once we called in the vendor and told them, 'We give up,' they were here right away," he says. The vendor quickly determined that the problem lay with the hard disk, manufactured by a third party. The vendor installed a temporary 135M-byte loaner drive until the other is replaced.

What would Watson have done differently, with hindsight? "I'd have hollered sooner," he said.

Dealers witness many user problems from a unique perspective. Feridan Uygur, district manager for the New York office of Microserv Technologies Corp., a distributor of networking products, has coached a number of dealers on handling network installations.

No place for a novice

Most network problems Uygur has encountered come from improper cabling. People sometimes use homemade cable that offers inadequate shielding and has improper impedance characteristics, making it susceptible to noise. Often the running of the cables themselves has not been done correctly.

Another problem category is boards. Any time a new board is introduced into a personal computer on the network, there is a threat of incompatibility from conflicting interrupts. Some boards are designed so that their interrupts are changeable, and a technician can alter them. Boards without changeable interrupts are best left out of a network.

Most network problems come from improper cabling. Another problem category is boards.

Programs often requires configuration during installation to gen the software properly for the network. Often, different versions of the software require a patch to make print routines and screen handling work properly. These comments quickly make it clear that network installation is no task for a novice user.

Uygur trains his dealers to run through a checklist each time they install a system for a client. Network purchasers should expect questions like these from consultants; if a dealer or consultant doesn't ask them, it might be cause for concern.

■ Do you have cable already installed? If so, what type?

■ How many users will be on the local-area network? What number of nodes and how many concurrent

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users? To what size do you expect the network to grow in the foreseeable future?

- What types of applications will be used on the system? Will there be any that are disk I/O intensive?
- What type of server will be required? Will it be dedicated or nondedicated?
- What will be the physical layout and the resulting topology? What are the distances between machines? Will it run on separate floors?
- Is there a need for remote access? Is there a need for gateways or bridges?
- What kinds of multiuser software do you need? Is it available from a third-party vendor?
- What are the cost parameters in the long run? In the short run?
- What kind of technical support will be needed? How much training will end users require?

The experiences of the veterans show that network installations are tricky, even when procedures are followed precisely. For the first-time network user, installations mean making challenging adjustments, including boards and master programs that need to be modified. Often the documentation is not updated properly by the vendor, and software releases are sometimes sold without being thoroughly tested.

Into the fray

However, the industry is maturing. More vendors are rallying behind the major players. With the emergence of standards, software incompatability will be less of an issue. Furthermore, new users now have a body of experience to draw upon to ease the transition to a fully integrated system. With the proper support from competent dealers and consultants and careful planning, a network may be implemented with much less difficulty than in previous years.

Already, the users who broke the ground in linking microcomputers are moving on to new levels of network technology: gateways to the mainframe. Stouder at Continental Grain is planning a network gateway to large-scale IBM computers the company maintains in Chicago. His purpose is to avoid having personal computer users dial into a protocol converter and then transfer the data between the file server's disk and the mainframe.

It is becoming evident that volume users are pleased enough with their network installations that their battles have produced no bitterness, war stories notwithstanding. These users are now going back into the fray, ready to tackle new technologies in the effort to maximize the potential of the personal computer as a business tool.

John Dounis is a director of the Center for Advanced Data Processing in New York. As a consultant there, he has designed and implemented multiuser personal computer applications using local-area networks.

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Support: Beyond Band-Aids

By Stephen Thurston

Most users of personal computer networks today could be classified as "early adapters." Intrigued by the technology, these pioneers purchased local-area networks soon after they were announced and before the path had been well-worn. By nature, they have been to a large extent self-sufficient in terms of installation and ongoing service and support.

But the customer profile is expected to change over the next two to three years, as personal computer networks are installed in greater numbers among smaller companies and office environments.

A key role in network maintenance is played by the network administrator. If that person is technically proficient and can diagnose problems effectively, there is less need for comprehensive on-site service. But in most cases, it is impractical to plan on installing a network without outside help.

Many local-area network users start by establishing a strong relationship with a local software consulting firm or independent consultant. Even if users are self-sufficient in terms of technical expertise, most rely on a consultant for initial network design, customized application software and ongoing support.

Hardware service has proved less of an issue to date. The mere fact that personal computers are operating in a network doesn't seem to imply greater service requirements, although critical network components — particularly file servers — should be covered by an on-site service contract.

Total system approach

The most appropriate type of service, however, takes the total system approach. From one service vendor's perspective: "What we're really offering here is support of a company's business environment rather than specific hardware and software components. We're offering protection against such things as user error, power irregularities — any number of things that might have an impact on that company's overall productivity and profit/loss."

The users' viewpoint, as expressed by one businessman, echoes the same need: "The computer views the network as a peripheral that is highly reliable. If the network is within one department only, service issues are simple — they're treated as an extension of the processor. But if multiple departments have access to the same network resources, there often is no interest in cooperating on such issues as service and support. It tends to be MIS that can work things out with a service vendor."

Estimates from network vendors indicate that the typical factory-level board repair/replace service has been sufficient to handle 75% to 80% of the customers who elect a self-maintenance approach. But as the network becomes more of an information utility, MIS groups will regain control, and those vendors recognizing the system approach will be the most successful.

Several such vendors have recently enhanced their offerings to accommodate changing requirements:

- Corvus Systems, Inc. now offers an on-line program, extended limited warranty, exchange warranty and on-site maintenance through Decision Data Systems.
- Nestar Systems, Inc. offers on-site maintenance (through RCA Service Co.), factory maintenance and a "rent-a-part" option, in addition to standard time and material rates.
- 3Com Corp. is establishing a program to provide service through a network of authorized dealers in conjunction with the availability of its 3Server product, a more critical network component.

The ultimate objective will be establishing single-source responsibility for network installations — from the planning/design stage through implementation and including ongoing support.

Retail/dealer organizations are best described as still being "on the learning curve" in terms of finding their optimal role in delivering service and support for personal computer networks. For some dealers, network support expertise will differentiate them in the market. Others find that a joint relationship with a local software consultant who provides support works best.

Learning the hard way

Many dealers have learned the hard way that a network sale requires considerable pre- and post-sales support. Having once underestimated the task of network installation and service, dealer service organizations are now wiser. They have also become cautious of naive customers wishing to jump on the network bandwagon who may later balk at installation hang-ups.

One dealer's comment is typical: "You don't rush a network sale. We'd rather turn the business away now than take on an unprepared network customer. Support is not a one-person job — it involves departments such as technical support and training. Our network specialist is now part of the service organization."

Third-party maintenance firms may never become that active in the network service market for personal computers. As a rule, third-party firms are participating primarily by making national agreements with local-area network vendors rather than actively marketing end-user contracts.

While they may be able to offer the advantage of multivendor hardware service, these companies lack diagnostic capabilities as well as the systems orientation for the "soft support" required for networks. Their forte lies in fixing broken machines, not in answering open-ended questions such as, "Why isn't my network running today?"

Third-party software consultants can add value in the form of programming expertise, tailoring industry-standard software to a multiuser environment. Use of such consultants is a common thread among many personal computer network users, and some have joint efforts with a major retail/dealer organization. Continued opportunity for such organizations to provide planning/design services and support is expected.

The ultimate objective, as local-area network users connect to other local and wide-area networks, will be establishing single-source responsibility for installations — from the planning/design stage, through implementation and including ongoing support and management of the "information utility."

Single-source capability

One group will shoulder complete responsibility for diagnosis and correction of any problem in the network, regardless of location and equipment involved. A designated service vendor, in essence acting as the customer's agent, would manage this whole process, including any subcontracting required. The customer would make only one call and hold only one contract.

In fact, some of the systems manufacturers already have this goal in mind as they develop their support services.

The real question is what value customers will place on such a single-source capability and whether they are willing to relinquish overall responsibility for managing these problems.

While a broader range of support services is an indication of the maturity of vendors and markets, users need reassurance that there will be continued service and support available. Those vendors who have effective service and support programs now are better positioned to be the long-term survivors in this emerging marketplace.

Stephen H. Thurston is a principal with The Ledgeway Group, Inc., Lexington, Mass. The market research/consulting firm specializes in service issues and recently published a report, "PC Network Service and Support."

IBM's grand scheme

By Eric Killorin and Paula Musich

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Printer Attachment, Cluster Program, PC Network, Cabling System, SNA — welcome to IBM products in search of a strategy.

IBM's helter-skelter development approach toward networking is changing slowly into a comprehensive solution.

It used to seem as if there were no overall strategy from IBM about how to link its computers. Different corporate divisions apparently pursued their own networking answers independently, each group concentrating on connecting the equipment it was responsible for supporting.

IBM now has a vision for corporatewide networking. Users expecting a big splash soon will be disappointed, however. IBM's solution will evolve rather than burst onto the scene as a single new product.

Like most large corporations, IBM will move ponderously, weeding out some products and adapting others. To piece together IBM's various Personal Computer network offerings, it's useful to put the needs they serve into a framework — a directory of needs and solutions. The "solutions matrix" defines four levels of networking needs and shows current products corresponding to each level of need.

The lowest level of the solutions matrix represents the need to share resources such as printers and modems. Here IBM offers the Printer Sharing Attachment, a data switch. The device enables four Personal Computers to share the Displaywriter letter-quality printer.

Solutions matrix: A directory of network needs and solutions

Primary User Requirements	Chief Rationale	Domain	Typical Implementations
Level I: Resource Sharing			
Output Devices Share printers and special-purpose output devices, modems	**Economic** Amortize cost and use shared devices over multiple personal computers	**Work Area** Small cluster (room, office); primarily small stand-alone group (fewer than 10 personal computers, one printer, one modem)	**Data Switches** Switches between personal computers and shared devices; support for standard interfaces (RS-232, RS-423, CCITT V.24). Examples: DEC Mini-Exchange; Advanced Systems Concepts Amps-11; IBM 5218 printer attachment; Apple Appletalk
Secondary Storage Share hard disks, diskettes, tape backups, printers, modems	**Economic** Amortize cost and use shared devices over multiple personal computers; eliminate need for hard disk in each personal computer; share systems and applications software	**Work/Local Area** Small cluster, (building, campus); primarily small to medium-size stand-alone networks (fewer than 25 personal computers, mass storage subsystems, two printers, modem)	**Network Servers** Disk/file servers (typically personal computer-based) or personal computers with onboard network interface units; twisted-pair or coaxial cable media. Examples: Corvus Omninet; IBM Cluster Program; Novell Netware/S; AT&T Starlan
Level II: Information Sharing			
Local Area Transfer and exchange information, messages, software between personal computers and other processors	**Data Access/Performance** Information sharing in multivendor environments; requirement for high performance; conformity to standards	**Local Area** Intra- and interdepartmental (building, campus); primarily medium-size stand-alone networks (fewer than 100 personal computers, several hosts and shared devices)	**Local-Area Networks** Coaxial cable-based local-area networks with or without servers; baseband or broadband. Examples: IBM PC Network; Interlan NET/Plus; Ungermann-Bass Net/One; 3Com Etherseries; Proteon Pronet
Local/Wide Area Transfer and exchange information as above, with expanded requirements for end-to-end communications across multiple environments/architectures/media — at personal computer level	**High-Level Network Functions** End-to-end message delivery; internetworking (bridges and gateways — local-area network-to-wide-area network, X.25); network management; multivendor support; conformity to Open Systems Interconnect model	**Wide Area** Intra- and interfacility (city, state, country); bulk of communications occurring locally (host systems with several hundred workstations)	**Layered Architectures** Hosts (personal computers if supported) as network nodes, multiple classes of processors/devices on network; routers used for internetworking; gateways used for connection to X.25 or other networks. Examples: IBM Systems Network Architecture; DEC Digital Network Architecture; Honeywell Distributed Systems Architecture; HP Advancenet

Source: Hyatt Research Corp.

Each IBM Personal Computer connected to this small device-sharing network requires the IBM Printer Driver program. The network will route print requests via the Personal Computer's asynchronous communications port to the data switch for subsequent dispatch to the printer.

The IBM 5218 Printer Sharing Attachment competes with the Mini-Exchange from Digital Equipment Corp. and the Amps-11 from Advanced Systems Concepts, each of which perform similar functions.

Network dark horse

The next level of networking need calls for sharing secondary storage, such as centrally located disk drives. IBM's Cluster Program fills this need.

Perhaps because IBM never referred to this product as a "local-area network," it generated little excitement within the user community on its arrival. Its chief strengths lie in its low cost and easy installation and operation. With the Cluster Program, half a dozen microcomputer users can share storage economically.

The IBM Cluster Program consists of software that permits the Personal Computer, Personal Computer XT, Portable Personal Computer and PCjr to share storage and exchange files. The Cluster Program requires single-board network interface units called Cluster Adapters and Cluster Attachments. In its fullest configuration, the Cluster Program supports file transfer, electronic mail and secondary storage sharing (virtual diskettes).

A server-based network configuration uses a Personal Computer XT as a nondedicated disk server, supporting up to 20M bytes of shared storage. In this setup, cluster users can access one private volume and one public volume. Alternatively, the network can be configured to support information sharing only, eliminating the need for a disk server since the network software resides in each workstation.

The Cluster competes with Omninet from Corvus Systems, Inc. and Netware/S from Novell, Inc., two well-established personal computer local-area networks.

IBM freely admits that the Cluster's performance will suffer during I/O-intensive sessions. Having I/O duties performed at the disk server degrades the performance of workstations, and conversely, I/O processes being completed by workstations will affect disk server performance. What all this amounts to is that the Cluster can reasonably support about six users, despite a theoretical limit of 64 users and some marketing recommendations of 20 to 25 users.

Neither the Printer Attachment nor the Cluster Program is destined to survive in IBM's future networking plans. Neither is well suited as a foundation for network expansion, and IBM may not ensure their coexistence with future products.

Off to a slow start

With two low-level personal computer network offerings from IBM, the market was anxious for a flagship local-area network and pinned its hopes on the PC Network, announced late last summer. Unlike the Cluster Program, the IBM PC Network targeted the next level of need — sharing information locally — and was much ballyhooed on its introduction. On closer examination, however, industry observers criticized the network for its use of broadband technology and its limited services. Subsequently, interest in this network declined.

Neither the Printer Attachment nor the Cluster Program is destined to survive in IBM's future networking plans. Neither is well suited as a foundation for network expansion, and IBM may not ensure their coexistence with future products.

The PC Network uses a different access scheme and different media than IBM's planned token ring network. Market experience so far has shown that the PC Network is not well suited for unsophisticated end users or for distribution through retail channels. It began shipping in limited numbers late in April, eight months after it was announced. It competes with a token-ring network called Pronet, from Proteon Associates, Inc., in addition to the various Ethernet vendors' micro offerings, such as Net/One from Ungermann-Bass, Inc. and the Etherseries from 3Com Corp.

Some dealers blame the product's slow start on a lack of multiuser applications software. However, the network's use of DOS Version 3.1 means that problem shouldn't remain for long. DOS 3.1 appears to be the standard for which personal computer applications developers have been waiting, with an unusually high number of multiuser applications packages for the PC Network already announced.

Other dealers blame the network's slow start on users' uncertainty about IBM's direction in networking. Historically, IBM has developed a multiplicity of incompatible networking solutions to sustain different areas of its product line. Users may be reluctant to invest in what they perceive as yet another limited offering with questionable future use and support.

And they are not wrong about IBM's own lack of commitment to the PC Network. If market and dealer response was lukewarm, the network's acceptance inside IBM has been even chillier. Produced by the maverick Entry Systems Division (the Personal Computer's originator), the PC Network is not considered a strategic network product by IBM's top management; in fact, the PC Network project was nearly canceled when IBM corporate executives learned of it.

Since the PC Network hit the market, it has been a transparent product, with IBM generating little publicity on its availability or use and little support for dealers selling it. IBM's dealer support rests primarily on a three-day training course. Very little else is being done to help dealers sell complex broadband technology to unsophisticated end users.

Selling the network successfully through retailers will require out-of-store sales people who are well versed in the network's operation. In all likelihood, only the full-service dealers who can give users plenty of hand-holding without much support from IBM will do well with this product.

Buy now, pay later?

The real cloud on the PC Network's horizon lingers in the ongoing debate over whether this network is merely a stopgap product that will be orphaned as was the PCjr, or if it will be supported even after IBM's token ring network is available.

Last summer IBM offered the token ring as the solution for end users needing to share information locally. Simultaneously, the company released the Cabling System, a partial media distribution plan for the token ring network. IBM's message was, "This is the network we'll be seriously selling two years from now. Here's the media it will run on. Buy it now, install the cable and wait for the rest of the product."

Only IBM would try such a move;

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whether the company will get away with it is questionable. Arch-rival AT&T offers a competitive wiring scheme, the Premises Distribution Wiring Plan. Moreover, the Cabling System is expensive to install: The drop cabling (that portion of cable linking the workstation to the wiring closet) is thick and inflexible, making it difficult for cable installers to manage more than one drop at a time.

Where does that leave the PC Network? Although IBM will not aggressively push the PC Network in the marketplace, it may be the primary Personal Computer interconnection product for some time to come, even after the token ring product is available. Key to its longevity — in addition to the standard forming around DOS 3.1 — rests in its use of Netbios, the network interface specification at the core of the token ring. In addition, some important software vendors offer packages specifically tailored to the PC Network.

Although IBM will not aggressively push the PC Network in the marketplace, it may be the primary Personal Computer interconnection product for some time.

SNA at the highest level

IBM's Systems Network Architecture is an 11-year-old communications architecture for passing information between terminals and hosts. It recently was expanded to support the growing line of IBM office systems and Personal Computers. SNA targets the highest level of networking needs — sharing information in a wide area.

SNA initially grew out of the need to interconnect IBM's hosts with terminals located some distance away. It was designed to distribute access to central processing at the host. As such, it uses a hierarchical structure — a master/slave relationship not well suited for peer-to-peer communications. Despite this dependence on the host for "permission" to establish connections, IBM has chosen SNA as the foundation for integrating its network offerings.

Consequently, SNA is evolving. It provides improved peer-to-peer communications to interconnect IBM's vast array of processors efficiently, and — most notably — the architecture now competes with distributed access models of network architectures such as DEC's Digital Network Architecture (DNA), best known under the product name of Decnet.

SNA has advanced significantly in the area of support for office applications as well. These features markedly improve the way SNA deals with documents passing among office clusters. Key aspects of SNA's office communications functions include the Document Content Architecture (DCA), the Document Interchange Architecture (DIA) and the Distributed Office Support System (Disoss) — all document interchange capabilities.

These specifications within SNA provide the essential ingredients for transferring the power of SNA down to the personal computer level:

DCA defines an encoding scheme for the document's content (what's in the "envelope"). The scheme is divided into two levels: "revisable" or level 3, which allows for editing and modifications, and "final text" or level 2, for print or display, which does not allow for modification. Revisable DCA has advantages in that it permits several stages of editing to be made by different users as the document is passed from one workstation to the next.

DIA defines the document's packaging and, consequently, the method for moving it across systems (the "envelope" itself). Four DIA services are offered: session, library, distribution and application processing.

Disoss acts as a centralized filing and retrieval system for devices in an SNA network. It defines an acceptable environment for passing information among hosts and workstations. Disoss/370, as it is often called, provides applications such as calendar management for managers and executives.

The IBM Office Systems Family (OSF) products permit document passing between Personal Computers, System/36s, and 370s. Among the most significant OSF offerings are the document interchange functions. Personal Services/36, for example, supports a document exchange-based network of System/36s, personal computers, Displaywriters and 5520s. Personal Services/370 allows file transfers from Personal Computers and 3270 Personal Computers to 370s in a Disoss/370 environment.

In spite of SNA's new capabilities, IBM is still far behind some competitors in supporting multiple operating systems on a single network and in allowing network users file transfers and shared peripheral access.Herein lies IBM's network challenge: to support many bus structures and operating systems — mostly incompatible — within a single communications scheme.

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PL/M on a VAX?
SuperCalc 3 on a PRO?
T/Maker Integrated on a VAX?
MS BASIC on a Micro VAX?
Milestone on a PDP-11?
Palantir on a PDP-11?

SpellStar on a PRO?
MailMerge on a PDP-11?
PMS II on a VAX?
dBASE II on a PDP-11?
Lotus 1-2-3 on a PDP-11?
Open Access on a PRO?
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Condor on an MV/10000?
Multiplan on a PDP-11?
WordStar on a VAX?
SuperCalc 2 on an Eclipse?
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Palantir on a VAX?
QuickCode on a PDP-11?
DISC-DBL on a VAX?
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WordStar on a PDP-11?
Spellbinder on an Eclipse?
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PerfectWriter on a PRO?
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Mass-11 on a PDP-11?
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network offerings meets an end-user need in the solutions matrix, ranging from simple to complex and from inexpensive to quite costly. These products make up the significant pieces of IBM's networking puzzle. IBM also plans factory networks, private branch exchange-based networks and links to public services networks.

As IBM develops its grand strategy to interconnect all of its processors from the Personal Computer to the large-scale systems, some of those pieces will fall into place; others will be discarded once they no longer fit. Some experts predict that the token ring, running over the Cabling System, will be the premier Personal Computer network offering and will be capable of linking nodes in an SNA environment.

The future of the PC Network is unclear. Some argue that it was doomed from the start because it doesn't fit into IBM's networking strategy of linking multiple classes of systems. They note that its progenitor has been removed from responsibility for the product and replaced by a "true blue" networking executive.

Others believe that the PC Network will survive at least the initial release of the token ring network, that this first release will not include network interface units for Personal Computers. VLSI chip development has been slow to materialize, making such an interface too costly. The token ring will use network interface units and software for medium- and large-scale systems, but Personal Computers will be linked via a bridge to the PC Network using the Series/1.

The PC Network may also never produce the long-awaited blossoming of the local-area network market. That blossoming will require a catalyst with a network architecture that meets the needs of IBM's key customers, runs on the installed Cabling Systems and supports SNA.

When available, the token ring network will provide the fundamental connectivity in IBM's effort to link its systems. The updated SNA, which will look quite different from the SNA brought out in 1974, will be the cornerstone of that network.

In the personal computer network marketplace, IBM may make a number of moves acknowledging AT&T's presence. The Cabling System, IBM's answer to AT&T's Premises Distribution System, will drop in price.

Despite IBM's acquisition of Rolm Corp. and the new MCI deal, IBM is not making overtures to become "your voice company." IBM is trying to maintain control and learn what's necessary to continue being "your data (in other words, information) company."

No single product or event will produce a final solution. However, the future of data processing is inexorably intertwined with data communications, so IBM must lead here as well.

Eric H. Killorin is president of Hyatt Research Corp., an Andover, Mass.-based firm that tracks the personal computer and network marketplaces.

Paula J. Musich is editor of "PC Netline," a Hyatt Research newsletter that analyzes the market for personal computer and office networks.

IBM's LU6.2 the new super link?

By John Doherty

Keying data from a computer printout into a personal computer spreadsheet is still normal procedure in today's offices. Connectivity can no longer be a buzzword — it must become a functional requirement for corporate computer systems.

IBM's answer for implementing micro communications in distributed processing environments is its Physical Unit 2.1/Logical Unit 6.2 (LU6.2), also called Advanced Program-to-Program Communications. LU6.2 is one of several software additions to IBM's Systems Network Architecture (SNA), which has evolved into the de facto communications standard for large systems.

LU6.2 serves as a foundation for IBM's overall office strategy: distributed automation, including the Distributed Office Support System (Disoss) and its supporting cast; Document Interchange Architecture; Document Content Architecture; and SNA Distributed Services.

Under Disoss, these new packages standardize data formats and distribution processes across different classes of computer systems. LU6.2's role is to integrate dissimilar computers into SNA as intelligent peers, not to leave them emulating fixed hardware slave devices.

Surveys show that effective micro links to mainframes are at the top of MIS shopping lists, ranking higher than hardware and off-the-shelf applications. But today most personal computers are really only used as adjuncts to, not active participants of, mainframe systems.

Terminal emulation is still the most widely used micro-mainframe link. When linked to the host in this way, the personal computer loses most of its independent processing power and often functions as no more than a display-only terminal.

Terminal emulation strips the personal computer of the versatility and power that first made it attractive as a desktop workstation. This emasculation of the linked personal computer is the natural result of prior levels of SNA dictating a slave relationship to a specific device type, such as 3270 terminals. In order for a micro to access host information, it had to "trick" the mainframe into thinking it was one of the host's 3270-type terminals. There was no standard way of allowing micro applications actually to integrate with mainframe applications.

The key to establishing strong micro-to-mainframe links is to have local programs talking directly to networked applications beyond 3270 mainframe slave device restrictions. LU6.2 — designed for exactly this purpose — will allow true distributed processing for the first time.

While today's micro links can download data, the information doesn't come to the end user in ways that are easily acceptable for local applications. Because the host thinks it's talking to a terminal, it sends down screens that are formatted to 3270 communication protocols.

The main aim of micro link developers, therefore, has been to allow users to move data directly onto local applications such as spreadsheets. By adding 3270 emulation extensions and program interfaces, some sophisticated links on the market today allow users to move host data to local files. With these links, host applications can talk directly with local applications, and the link serves as the interface.

For instance, by using links that have program interfaces compatible with IBM's Applications Program Interface, users can select data from a large host file, transfer it onto a micro spreadsheet application to create a special report and then print the report on a local printer, all in a single mainframe session.

The key to establishing strong micro-to-mainframe links is to have local programs talk directly to networked applications beyond 3270 slave device restrictions. LU6.2 is designed for exactly this purpose.

Regardless of the type of link, users are still tied to the mainframe in a master/slave relationship for controlling data distribution functions along the network. Although the end user is insulated during this process, there is much work to do before the link is completely automated. For now, the applications developer still has to treat host data as if it were just 3270 terminal readouts.

LU6.2 is the direct application-to-application interface to mainframes and will ease user dissatisfaction with the drawbacks of today's links. With LU6.2, users running a micro program can call data directly off the disk drive in the mainframe and process it on the local application. This means that users can sit at a micro and structure an Information Management System (IMS) call or query as if it were on the mainframe. To access the host data base, users only have to query the local data base. This peer-to-peer feature of LU6.2 frees the micro from the mainframe's data management controls and places network resources on an equal status for accessing and distributing files.

Under LU6.2, data processing is shared throughout the system, reducing the host's processing load so the mainframe no longer has to serve as traffic cop to route data. From the micro user's viewpoint, even the mainframe becomes a peripheral device to be used at will.

LU6.2 also provides program-to-program communications. Any two programs on any two machines can communicate on the network, regardless of the operating systems or languages used. For instance, a C program that runs on a Unix machine can talk to an IBM MVS machine running a Cobol program. The programmer does not have to know the language or the operating system of the target program.

In the past, whenever IBM developed a large system, it used proprietary operating systems and was very protective about them. However, IBM found that by releasing its hold on MS-DOS and allowing other companies to use it, the market for MS-DOS naturally expanded, creating greater interest, understanding and revenue from end users than had previously existed.

IBM is doing the same thing with its LU6.2 machines, which include Systems/36 and 38 and Displaywriter. In addition, by letting other vendors use non-IBM micros to access mainframe data as if the disk were locally attached, IBM is establishing an incentive for software developers to provide the industry with interfaces to SNA. These companies are supplying the gateway to Disoss, including LU6.2, and applications developers will follow with products for local applications use.

Essentially, the micro communications business is at a major junction. On the one hand, communications developers for large systems must continue to market sophisticated links based on current SNA 3270 communications standards. By making these links compatible with LU6.2 for micro applications in the near future, the transition to LU6.2 will be that much easier and swifter.

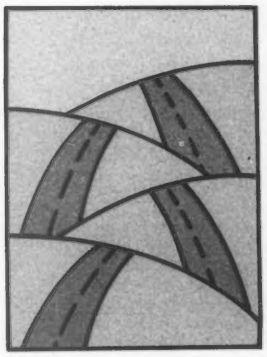
On the other hand, software suppliers must simultaneously help clarify and define future environments for office communications, especially as software solutions to network communications such as LU6.2 and Disoss begin to supersede the hardware boundaries of SNA.

In this new environment, communications software suppliers will play a key role in providing multiple data routes between computers and programs. And traditional applications vendors will continue to create the end-user vehicles. Data communications will continue to change, with more complex elements but with more productive results.

John Doherty is vice-president of marketing and sales for Rabbit Software Corp., a Malvern, Pa.-based manufacturer of business communications software for micro-to-mainframe links and local-area networks.

On the road to the mainframe

By Gary Audin



The simplest approach is through a cluster controller. Users have made protocol conversion another popular alternative. Networks finish last.

The search for a quick, transparent, powerful micro-to-mainframe link leads users down many a winding path. Today no one alternative presents an ideal solution for personal computer users needing to link to a host. The micro-to-mainframe market is still in its adolescence. Users who need to make connections right away must contend with certain technological issues.

The most familiar approach to micro-mainframe links is straight terminal emulation, where the personal computer mimics a terminal on the host network. In some cases, the mainframe can be programmed to support specific micro communications protocols, but most often the emulation package includes host protocol capabilities for the micro. The exceptions are usually held for higher performance asynchronous protocols such as Xmodem and Communications Research Group, Inc.'s Blast.

A second alternative is to connect the personal computer to a protocol converter, which allows the micro to function as an already supported mainframe terminal. Protocol converters provide the same capability as terminal emulation, but the protocol converter approach can be less expensive and can provide a few extra capabilities as well.

A third approach is to connect the personal computer to the host via a cluster controller, such as the IBM 3274 and 3276 CRT cluster controllers, which involves equipping the personal computer with a special adapter card. This approach has the advantage of exactly emulating an existing mainframe environment and does not require any changes to the host. However, there may be some applications changes needed to make better use of the personal computer. Any approach that restricts the micro to dumb terminal functions reduces its power and effectiveness.

A fourth approach is to take a local-area network supporting personal computers and provide a gateway to the mainframe world. Gateways usually emulate a cluster controller, but other emulations are also available. *[The gateway as micro-mainframe link is covered in depth in "Gateways," p.35.]*

A fifth approach uses a public network service as a conversion mechanism. Services such as Tymshare, Inc.'s Tymnet and GTE Corp.'s Telenet provide protocol conversion as part of their communications function. This approach, however, has a limited number of conversion capabilities, fewer than the other approaches.

Adding terminal emulation software to a personal computer is the original solution to the problem of delivering mainframe access to a desktop micro. The communications program itself may be made up of several components including protocol software, user interface and set of procedures, automatic dialing and directory support, file transfer and in many cases a text editor for deleting and inserting special control codes as necessary.

Personal computers can communicate in one of three modes: text, native or transparent. The text mode allows the personal computer to communicate printable and displayable information. However, it usually requires the filtering out of any word processing, spreadsheet or other control codes prior to transmission. The receiving personal computer or mainframe can usually display or print the information, but all executable codes, such as spreadsheet formulas, can only be displayed, not processed.

Native mode uses a modified protocol to transfer word processing, editing and control codes. The receiving machine can process the information as well as display it. Native mode is limited to specific applications and programs.

Transparent mode, sometimes called binary mode, allows any combination of applications to be transferred between two machines. Transparent mode is especially useful in moving programs and files, since it places no limitations on the data transferred. Transparent mode is the most versatile, but it does not guarantee that the receiving machine can process the data, only that the protocol does not interface with its transfer.

Most terminal emulation software for personal computers provides asynchronous communications, specifically TTY-compatible emulations. TTY-type terminals that are commonly targeted for emulation include IBM 3101, Televideo Systems, Inc.'s 910, Tektronix, Inc. 4010 and Digital Equipment Corp.'s

VT52 or VT100 terminals, but most packages allow the end user to set up particular attributes for the desired protocol. Others provide prestored menus so that end users need only select the type of terminal to emulate. TTY emulation packages vary in their range of capability and are usually, but not always, text mode transmission, sending one message at a time rather than breaking data up into blocks.

There is a second group of asynchronous protocols designed specifically for personal computers. Xmodem, Blast and others fall into this category. These are block-oriented protocols with automatic error detection and retransmission. They are generally transparent as well.

Xmodem is a half-duplex single block acknowledgment protocol resembling the Bisync protocol. It comes with two forms of error detection, a checksum or cyclic redundancy check (CRC). Many additions have been made to the Xmodem protocol, which is in the public domain. Most are compatible with each other, but the user should verify compatibility prior to purchase.

Xmodem and its variants are also available as mainframe software packages, which reside behind the mainframe protocol software operating as an application program.

Blast is a more modern protocol, with many of the attributes of IBM's Synchronous Data Link Control (SDLC). It is a transparent, full-duplex protocol with multiple block acknowledgment; up to four blocks can be sent before transmission will stop. Blast uses the CRC mechanism for error detection. Because of its multiple block feature, Blast is far better than Xmodem and similar protocols at handling satellites.

Xmodem, Blast and their variations are primarily file transfer protocols. The are usually designed with block numbering to ensure no data loss. Many have block number error checking independent of data error checking. The cost of these programs ranges from $35 to $250 per copy, with the bulk costing from $100 to $150 each. Some of the programs are offered with companion mainframe software packages, which integrate smoothly but which usually cost 10 to 40 times more than the personal computer package.

On the other side of the coin are terminal emulation packages that use synchronous protocols such as Bisync and SDLC to emulate specific terminal types. The most common support IBM terminal protocols for the 3270 family, both standalone terminals and cluster controllers, and the 2780, 3780 or 3777 batch terminals. Other vendors, such as Burroughs Corp., Honeywell, Inc., NCR Corp., Digital Equipment Corp. and Wang Laboratories, Inc. also provide support for their own personal computers to connect to their mainframes.

The synchronous protocols allow devices to communicate at much higher speeds than asynchronous programs can. They require a different kind of communications adapter for the personal computer, one that costs $300 to $400 and may handle both Bisync and SDLC. The number of software packages available and the vendors supporting synchronous protocols are considerably smaller, and the cost of these packages is considerably higher than their asynchronous counterparts, ranging from a minimum of $500 to more than $1,000 per copy.

Aside from price, the greatest difficulty associated with these protocol packages results from polling, which virtually all synchronous protocols use. Polling can make personal computer transactions unusually awkward.

If the communications program is removed from the personal computer so the micro is no longer operating as a terminal, then the micro will no longer respond to polling and selection. The mainframe will continue to try up to a limit, usually seven retries, before it enters a failure detection mode. During this time, it usually locks up the communications circuit so other terminals or micros cannot use it. Once the personal computer in question has failed to respond beyond the specified limit, the mainframe may turn off that personal computer as a terminal or even go as far as terminating all transmission on that communications line.

Mainframe operations personnel must then reinitialize communications for the personal computer. If an end user toggles back and forth between process mode and terminal mode randomly throughout the operating day, this approach becomes not just cumbersome but unworkable.

A multitasking communications program could alleviate this problem but can also place undue limitations on the applications programs. Very few multitasking programs are yet on the market, and they remain largely unproven. Thus, the best candidates for synchronous terminal emulation are users who usually stay within one mode or the other.

More recently, protocol converters have been marketed for personal computers to link to hosts. But most of those on the market assume that the device that is operating in the TTY mode is a dumb, nonprogrammable terminal; in other words, they are not tailored to the personal computer's wide range of capabilities and so fail to take full advantage of them. The success of protocol converters depends in part on which two protocols are being converted and what kind of dumb terminal is assumed.

The products themselves work well, but many users have overestimated their capability or expect them to work in environments for which they were not designed.

A protocol converter does more than convert the protocol: It generally performs function and format conversion as well. The most typical protocol converters are for TTY-compatible terminals to communicate to mainframes and in most cases support IBM 3270 series terminals. The typical configuration allows TTY-compatible terminals to communicate through the converter and emulate Bisync or SDLC 3274/3276 Cluster Controllers, 2780/3780/3777 terminals or X.25 devices.

Configurations for protocol converters normally place them between the terminal and the front end or communications adapters on the mainframe. The converter itself could be located at the terminal site with the terminal directly connected to the converter. It could be in the network connected by modems, or it could be coresident with the front end attached locally. In any of these cases, operation is identical. Up to eight dumb terminals can be connected to the typical protocol converter, but smaller sizes supporting just two or four terminals are available.

The protocol converter vendor who supplies the hardware and system may also supply the appropriate software for the personal computer. The personal computer-resident software is designed to work through that converter, but it may not always have all the features that are expected.

Converter systems are available from a wide range of companies, including protocol converter companies, multiplexer companies, those who manufacture packet assembler/disassembers and AT&T and the divested Bell operating companies, as well as IBM and other computer manufacturers.

MITCHELL J. HAYES

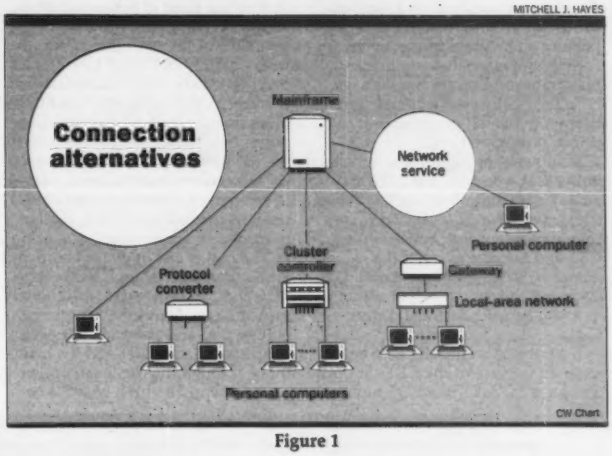


Figure 1

The cost of these converters varies considerably. A few years ago it was $1,000 per terminal connected, but the price is now hovering near $350. In the past 18 months, much attention has been focused on tailoring protocol converters specifically to personal computers, making it an easier, more popular choice for users. Now it actually may be cheaper to make the personal computer TTY-compatible and pass information through a protocol converter for about $500 per terminal rather than program the personal computer to operate in a Bisync or SDLC mode costing close to $1,000 per personal computer.

The protocol converter also solves the polling problem that occurs with personal computer-resident software connecting to mainframes. The converter stands between the personal computer and the mainframe and automatically responds to the polling and selection. Even if the personal computer is in processor mode or disconnects, there is no failure condition, since the converter satisfies all the normal conditions on the communications circuit.

Protocol converters have their disadvantages as well. Any kind of conversion system has to store and then forward the information through the conversion process, so protocol converters may cause a noticeable slowdown in response time. The protocol converter generally has to do downspeed conversion, slowing down the mainframe transmission so that it does not overload — typically from 9.6K to 1,200 bit/sec. Doing so extends the transmission time from the mainframe to the personal computer, making it much longer than if the personal computer were operating with the synchronous (higher speed) protocols.

Another problem occurs when the personal computer is dialing the protocol converter. The personal computer connects to one of the available ports on the converter and then signs on to the mainframe at a particular mainframe port (for example, Port 1). If for some reason the personal computer is accidentally disconnected from the converter and the user wants to continue the session, there may be a problem dialing into a different port on the converter. The mainframe only recognizes the terminal on the port it originally came in on, so the end user may have to back up and restart part of the session.

Another problem occurs if the personal computer disconnects and someone else accidentally connects to Port 1. The mainframe does not know that a new user is connected to Port 1 and does not force the user to go through the access procedure. The second end user will be signed on as the first user, which creates a security problem.

Furthermore, while protocol conversion systems can make up for anything that is different in a communications facility, they cannot rearrange keyboards or change the amount of display on a screen. If a terminal can only handle fewer than 25 lines of display, for example, then it is difficult to emulate the 3270 product line because these terminals normally convey 24 lines of data and a 25th for control.

These problems should not discourage the use of protocol converters but point to a few snags in combining them with personal computers and mainframe operations. Some snags have yet to be ironed out and currently require manual procedures at the personal computer end.

Many existing mainframe systems in the IBM world include 3274 and 3276 cluster controllers, each of which support eight or 32 local CRTs. The communications link between the CRT and the cluster controller is unique to that environment and does not use a normal modem or communications adapter-oriented connection.

If a personal computer is to be attached in place of the CRTs, it must emulate a 3178, 3278 or 3279 terminal. A different form of communications adapter is required for this connection. One of the most common is the Irma board from Digital Communications Associates, Inc. The Irma board is a special processor interface that plugs into the back of Personal Computers or compatibles, substituting for the 3278 terminals. Some newer models of interface boards allow a personal computer to connect to multiple sessions through a common cluster controller — windowing.

The cost of the interface board and its associated software is between $750 and $950 per board. Additional software can be procured for transmitting files and programs between the personal computer and the mainframe through the cluster controller environment. The Irma board is becoming a de facto standard, and many of the descriptions for these software products specify the board as a requirement.

The cluster controller approach solves many of the problems of the protocol converters. Although cluster controllers do store and forward information, their higher speed transmission reduces the delay significantly. The personal computer is always connected to the same port, so the disconnect problem and the security problem of dialing into protocol converters disappear.

The interface board satisfies all the requirements for the cluster controller, so the personal computer can operate in process mode whether or not it is also communicating through the cluster controller. This particular approach is of greatest interest to those who already have installed a cluster controller network.

However, cluster controller connections depend on coaxial cable, which may effectively slow personal computer operations. Although the transfer speed on the coaxial cable is in the 1M-bit range, it is not safe to assume that the transfer to the personal computer will operate continuously at that speed. The cluster controller is servicing other devices and sends bursts of transmission to and from each of the CRTs. The transfer rate will also be affected by the programs placed in the mainframe and by the cluster's connection to the mainframe, which may be limited to 9.6K bit/sec.

Some users may opt to reach the host by tying into existing enhanced network services such as Tymnet, Telenet, Uninet and other service companies that provide conversion and interfacing as part of their communications function. These services offer interactive and file transfer capabilities through worldwide networks. This approach is perhaps the most convenient.

The services predominantly support TTY-compatible devices. At any given moment, approximately four out of five connections in operation nationwide are using this protocol. The network services provide a limited number of conversions to other protocols such as Bisync, 2780, 3780, X.25 and in some cases emulate 3271 and 3275 stand-alone CRTs.

The micro/mainframe connection works best when the personal computer- and mainframe-resident software packages are provided by the same vendor.

The network services have some of the limitations of the protocol converter systems. They do cause delay, and the delay can be significant depending on traffic. It may at times exceed three seconds in one direction, making the round trip delay exceed six seconds.

These networks were designed as terminal-to-mainframe communications services, so their support of mainframes is straightforward. A number of products are available that allow the mainframe to connect to other networks. The network can be perceived as a series of TTY terminals or a number of Bisync devices or even as an X.25 device.

The personal computer user pays per minute for connection time to the network. The connection cost varies from about $4/hr to $9/hr. A second charge is made for the transmission of the data itself, which may be $.05 to $.10 per thousand characters or about $1.50 to $1.60 per thousand blocks or packets of data. Communicating within the U.S. costs the same, no matter what the distance. Thus, it is far more attractive to the regional or national connection and less attractive as presently priced to local or statewide communication.

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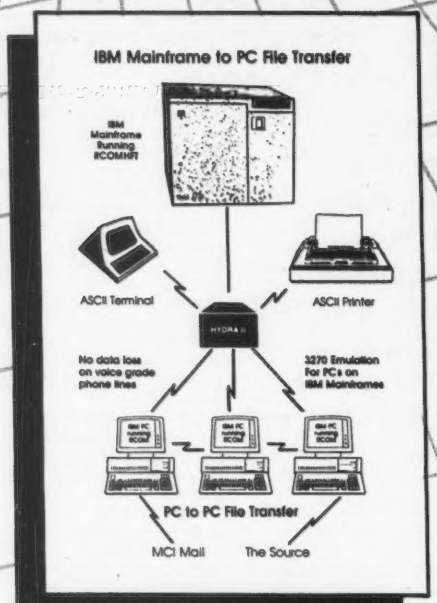
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Since the deregulation of this type of service in 1982, companies such as General Electric Information Services Co., Compuserve, Inc. and ADP have entered the field. This service may also become more attractive as more of the divested Bell operating companies are allowed to implement packet networks within their territories.

The primary disadvantage of this pay-as-you-go service is that the bills can eventually escalate beyond the cost of protocol converters or cluster controllers. The cost will probably go up as the price of private lines increase. Finally, the number of possible protocol conversions available from public networks is more limited than from protocol converters.

Once the basic micro-to-mainframe connection is made, users must look for ways to smooth operations. There are many programs available from software houses to support communications to personal computers.

Typically, the packages are available for IBM mainframes, although there is a scattering of packages available for the DEC PDP-11 and VAX series and occasionally for Control Data Corp., Sperry Corp. and Burroughs computers as well. The packages normally run as application programs behind the communications software, so they do not disrupt the mainframe environment in most cases. However, if the personal computer user wishes to communicate with existing applications, it may be necessary to revise the resident application program to work with the new communications packages.

As with any new venture, there are going to be difficulties, especially with the earlier products. The products themselves work well, but many users have overestimated their capability or expect them to work in environments for which they were not designed.

For example, not all communications products with the same modems and the same communications circuits perform equally. Depending on the design of the protocol and the operation in the mainframe as well as the personal computer, there can be as much as a 2:1 difference in transfer speeds. Users will see that two different software products operating at 1,200 bit/sec. have measurably different throughput time for files or transactions.

In addition, compared with the documentation DP managers are used to seeing, the manuals for many of these products can be extremely difficult to read. Users may resort to trial and error. Another weak area surfaces as users try to pin down errors and failures and the procedures for responding to such conditions. Most are difficult to understand or just poorly thought through.

Most of these products were introduced within the last two years. The experience level of most users is rather light, and there is very little available information as to the quality and performance of the products. Compatibility is the major issue for the mainframe user, but often it is difficult to ascertain from vendor literature how compatible the products are with the existing environment.

Many communications programs, because they are relatively low in cost, come with little vendor support. Support may be through telephone help lines, which in many cases costs $25 to $250 per year to access. Updates may or may not be included.

And although many of the products are the plug-in-and-go variety, they are not necessarily flexible. It may be difficult for the user to modify the operation, and he may have to work around the facilities rather than develop new ones. The micro/mainframe connection works best when the personal computer- and mainframe-resident software packages are provided by the same vendor. This option may not necessarily lead to increased flexibility but certainly reduces the interfacing and compatibility problems.

But the products and the vendors are improving rapidly, especially those mainframe software vendors who are now entering the personal computer market. Companies such as Applied Data Research, Cullinet and others should be watched closely to see how they produce and support these products in the mainframe environment.

Not all products with the same modems and the same communications circuits perform equally.

For now, the simplest approach for communicating to the mainframe is through devices such as the cluster controller, which produce the least impact on existing networks. Users who lack experience — or the time to gain experience in a hands-on situation — may be better off waiting for market forces to drive the natural selection process.

Gary Audin is president of Delphi, Inc. and a seminar leader for Datapro Research Corp., the American Management Association and others. He has developed video-assisted instruction and computer-based training (CBT) modules in microcomputer applications and in data communications and telecommunications. The first CBT is in micro-to-mainframe connections.

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Dialogue

Joseph Brophy

Senior Vice-President, The Travelers

What happens to a user who is out in front of his industry and his major computer supplier as well? He grows a lot of his own software, for one thing. He weaves integration into a crazy quilt of networks and machines. That's the story of the Hartford, Conn.-based insurance giant, The Travelers, as related here by Joseph Brophy.

Consultant George Colony of Forrester Research, Inc. in Cambridge, Mass., surveys and analyzes how large corporations use technology today and suggests how they could use it tomorrow.

Brophy and Colony discussed practical problems and solutions of micro communications with Extra *Editor George Harrar.*

George Colony

President, Forrester Research, Inc.

ILLUSTRATIONS BY ALAN WITSCHONKE

Extra: What applications are driving companies to link personal computers?

Colony: One of the problems is that there are very few applications today that really require communications. We're finding that most Fortune 1,000 users have focused on stand-alone applications. With a few exceptions, such as electronic messaging, there's really no driving force.

We're missing the key element. I expect that's going to change over the next two years.

Extra: What will be that key element?

Colony: You're going to see networkable software emerging from companies like Lotus and others we haven't heard of yet — new third-party software vendors — which will have networkable data bases, networkable spreadsheets, better electronic messaging systems.

Coming into play will also be what I call "departmental resource processors," what we now consider minicomputers, acting as software distributors for networkable software.

Extra: Is there a driving force in The Travelers for linking personal computers?

Brophy: Yes, there are two driving factors affecting networking here. We have about 9,000 personal computers; about 4,000 of them are in the offices of independent agencies. They can place their business with The Travelers or a number of other companies.

In our business, traditionally we've had a lot of paper flow from the independent agencies into our field offices and from there to the home office. We've eliminated the leg between the field office and home office by having people in the field office key information directly into our computers through remote CRTs.

We also want agencies to transmit directly to us rather than printing and mailing paper for us to key in. We had a practical business opportunity to have agencies interacting directly with our mainframes. We have turnkey applications that provide our independent agencies with office functions — payroll, insurance rating, policy issuing — and a good deal of interface software.

That has had a beneficial impact in terms of reducing paper flow, redundant keystrokes, printing and so forth. So there has been a practical need to link personal computers from a service point of view, from a cost point of view and from an accuracy point of view.

That's one side of the equation. The other side is that over the years we've had a high level of personal computing in our end-user community — business technicians, actuaries, accountants, marketing analysts. At one time we had as many as 8,000 IDs in our personal computing network, much of it for interactive timesharing.

Now the end users can do a lot of office functions on a personal computer. They do a lot of spreadsheet work, but they also have to communicate with each other. They still have a tremendous reliance on the host computer because they access data and upline and downline load.

Since they are coming from a highly networked environment and moving into a personal computing environment, we've had to provide them communications service.

Colony: Are most of your personal computers communicating by a dial-up link?

Brophy: We've got five environments, one of which is dial-up. We recommend dial-up if you're going to transmit less than two hours a day.

Some personal computers are networked — some are on a local-area network and have a gateway. We're an SNA shop, with about 20,000 terminals. We're also a heavy user of packet networking.

Our fourth environment involves mailing diskettes around. Our executives, for example, conduct some of their business meetings around a diskette, instead of sending a paper report. We have a machine that cuts the diskettes. We probably mail thousands of diskettes every month because it

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happens to be a very economical way for us to communicate.

The fifth environment is really stand-alone. Many new people using personal computers have no need for communication. As they become more comfortable with the personal computer, they begin to develop communications needs, and we give them four choices: the local-area network; the diskettes; the dial-up; or being actually hard-wired to our network.

Extra: Is that a typical situation in a corporation — multiple options for communicating?

Colony: I don't want to compliment Travelers too much, but I would consider it to be the No. 1 or 2 company in implementing communications for personal computers. Perhaps Aetna and Equitable are on that list as well. Joe's case is distinct among the Fortune 1,000.

Extra: You just mentioned three insurance and financial companies.

Colony: Insurance companies are leading in this area. We just did a survey in the chemical industry. We're finding that the level of communications for personal computers in manufacturing is much lower than in information-intensive businesses such as insurance and banking.

In manufacturing for 1985, only about 14% of the personal computers are communicating. By 1987, the companies are estimating it will be 35%. In the service side of the economy, in 1985 it's about 17% communicating and 55% by '87. So there really is quite a difference between the two sectors.

Extra: The Travelers is a strong IBM shop. How is IBM helping you to accomplish the integration of personal computers?

Brophy: I don't want to sound negative, but IBM really hasn't contributed a whole lot of software. Unfortunately, we've been out in front, which has caused us a good deal of frustration. We've had to resort to probably five or six different hardware/software solutions here.

If we're going from asynch to X.25, we go over packet to get into our SNA environment. If we're in a bisynch environment, we'll go through a Series/1, and we've got some pretty powerful software to do these protocol conversions. If we're in an asynch environment in the field and we're dialing in, we might go through a Protocol Computers, Inc. box to get to SNA. We're anticipating help in the future, but we've had to do it in-house so far.

Extra: What would you like from IBM?

Brophy: Fundamentally we'd like IBM to make this whole process of communicating transparent to us. We're anxiously awaiting more details on the free token-ring architecture. We've wired most of our buildings now for token ring. We'd like a lot more networking and applications interface-type software and support from IBM.

Colony: It sounds like you have the physical connection pretty well licked with local-area networks, SNA and dial-up. What about what I call the "logical connection" between personal computers and departmental systems and mainframes? I'm talking about moving documents with a high level of compatibility and perhaps in the future actually moving applications among those three types of systems.

Brophy: We do all that today, but we do it with a lot of homegrown software. There are very complex aspects of moving software around. Keeping data bases in synch, for example, is probably the most complicated transaction we have. If you have data in a remote node and a data base in a host — I don't see anything on the horizon that's going to simplify the integrity and compatibility issues.

We've solved the physical problem. As far as the logical problem, no! We are pleased that we can ensure we are capturing all the data and transactions that we transmit, but we have no guarantee of interim synchronization of data and programs.

Colony: We're observing that a number of the Fortune 1,000 companies are not accepting the System/36 solution IBM is offering, which is basically their logical communications solution. Safeco in Seattle has thrown all their System/36s out, saying that the system isn't performing. Is Travelers going to accept the System/36 solution? Are you buying that solution from IBM?

We need the most cost-effective way to make logical connections to personal computers in the field. We've solved the physical problem. As far as the logical problem, no!

— Brophy

Brophy: Our need is for the most cost-effective way to make logical connections to personal computers that are distributed in the field and in the home office. To do that, we developed an emulator that runs in the personal computer and a relay program that runs as an application under Vtam, so that we can use a micro over an X.25 network and make it look just like a 3270 terminal. We have made the logical and the physical connection through our own software.

To provide the interhost relationship, we have built — under Vtam again — a host switch that allows the personal computer in the field to access numerous applications through our own software.

Colony: I consider your emulator, your Vtam, your X.25 communications and so on to be the physical side of the communications problem. What I'm talking about here is moving, for example, a Multimate document up into a departmental system and then retrieving that document, perhaps through Disoss, or taking a Lotus 1-2-3 spreadsheet and moving it with full compatibility among a number of different systems. What I'm asking is, is Travelers buying off on the System/36 Personal Services and Displaywrite solution linked with Disoss?

There are few applications today that really require communications. We're still missing the key element. But that's going to change over the next two years.

— Colony

Brophy: I believe the System/36, from what I've read, is a great product. But from a conceptual point of view, I don't see it fitting into our fundamental architecture. We see two nodes — very powerful micros and a great network capability, and our host computers. So I question why we would want another node in a network when one of these powerful micros can serve as the gateway or the office controller.

The departmental computer is a conceptual problem I'm having difficulty with. The System/36 may prove to be an important factor in departmental processing, but right now I don't see it. Moving a Lotus program from one personal computer to any other one — that problem we've solved. We do move files, but we do it through a non-IBM solution at this time.

Colony: I think we're going to have a fundamental disagreement here, because what we're observing in the Fortune 1,000 is not a two-tiered architecture, as you're explaining for The Travelers, but rather that there will be some sort of local resource processor for personal computer users within their sight.

If personal computer users want to get up to the mainframe, they will go through that departmental processor, which will give them SNA or X.25 or your emulation package. They will not connect directly through their own link to the mainframe.

Brophy: We do have a fundamental disagreement. I'm thinking ahead — and it may be wishful thinking — looking for follow-on products to the Personal Computer. The Personal Computer, including the Personal Computer XT or the AT, is not powerful enough in some cases today — and in a lot of cases in the future. I'm assuming that we can extrapolate from the Personal Computer to the Personal Computer XT to the AT and so forth and look for follow-on products that will have sufficient extra power.

I can see file servers and print servers. I can see distributing some of our host computing power into a field office, using a low-end 370-type product, but that would be done for performance reasons — response time, economics and space. I would not see that as a fundamental architectural issue.

Basically, we're going to have very powerful micros, a sophisticated network and large host computers. The host may be in one of our data centers or in fact it could be in the field as well. But we would be thinking of that host as a corporate processor and not as a departmental computer.

Colony: American Express Co. has a number of personal computers in their New York facility, and at least some of their mainframes are located in Fort Lauderdale, Fla. One of their problems is that if those personal computers start dialing up the mainframe for two to four hours per day or even one hour per day, the communications costs are going to be prohibitively high. So their solution is to take a piece of the mainframe and shove it out into the site of the personal computer user and minimize the communications cost for each user.

Brophy: They may very well want to do that. But I don't see that as an architectural question; it's really a cost/performance problem, and there are other alternatives. I do not interpret your example of American Express as meaning you fundamentally need three levels in your network; rather, it's just a practical problem of where you want to situate your mainframes.

Colony: A couple of things I see coming down the road here: One is site licensing of personal computer software, because again we're talking about corporate customers who want to take their Lotus, put it on their departmental system and let end users simply dial in and downline load that application. Of course, Mitch Kapor doesn't want to do this; he wants to keep his margin on the product. But I see that coming, and you'll need a departmental computer to do it.

The second is the distributed data base. If in fact that animal is coming down the road, we will take a piece of that data base, shove it out to the departmental machine, and 95% of the data base requirements of each personal computer user at that site will be met by that departmental machine. When that extra 5% is required, then yes, they would go out to the departmental system, into the corporate network, out to the mainframe, get that information and bring it back down to the network.

Brophy: If I were Lotus or another vendor, I

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wouldn't see a distinction between having site software on a departmental machine and on a host. If we have 20 people using that site software going into a departmental machine or going into the host, I'd want to charge them the same.

On your second point, the data base is independent of a departmental computer. The data base, if we distribute one, will be on a file server attached to a microcomputer. I don't see a departmental machine having anything to do with that. The data base is a data base, and it's going to reside on a disk pack.

In our environment, I suspect we'll have it in both places. We'll have a data base on our host computer, and we'll downline load a portion of that data base to a microcomputer. We've got 550 [IBM] 8100s in the field, and they have data bases out there. They're updated during the day and upline loaded at night so we have a copy in the home office. Then, host data bases are downline loaded again — of course, not the entire data base, just the items that change.

Today we could view the 8100 as a departmental computer, but I don't see it in the future, as we have more powerful micro software and more local networking. There are going to be situations where people on the network are going to want to access a common data base, and the economics are going to say it should be on a disk drive sitting out in the field office as opposed to being on the host or vice versa. But it has nothing to do with departmental computing.

Colony: You don't seem that worried about the communications costs between your mainframe and each personal computer. What if every day a Lotus user had to downline load his application from your mainframe — we're talking about 500K bytes. You don't see that as a problem as far as the cost to communicate?

Brophy: I wouldn't encourage that user to downline load his Lotus application. It should be on a diskette locked in his desk, or it should be on a hard disk on his micro.

Colony: What if the site license is so arranged that Lotus only gets money every time that application gets loaded off of some control processor, whether a mainframe or departmental system?

Brophy: I suspect that the economics in our case would favor each person having his own copy of a Lotus package because we could get such a big discount.

If we had 9,000 copies, I'm sure we could work it out with Lotus that it's more convenient to give everyone a copy, but we want the same price or better as a company that had it on a departmental machine and was going to downline load it.

Extra: George, earlier you heard Joe describe generally what he would like in terms of help from IBM in the next couple of years. What can we expect from IBM?

Colony: Despite what Joe has been saying, what the IBM strategists are telling me is that they believe most IBM users will want a three-tier architecture. So I expect IBM to be pushing departmental computing very strongly — based on the System/36, of course, in the short term, and now the System/38 has been brought in. I believe you will see a VM-based, very small 370 offered by IBM in the next 12 months as a departmental system.

What IBM is doing here is divorcing the architecture, and I'm really talking about software — Personal Services and Displaywrite, PC/Attach — from the machines, so that IBM will be able to move that software from the System/36 to the 38 to the small 4300, if required.

Number two, IBM sees itself in a pitched battle with AT&T. AT&T is trying to sell its Premises Distribution System.

I see IBM and AT&T in a direct fight to wire corporate America in the next two to three years. The cable system will be a very important element. IBM will describe that system for third parties and also for users like Joe but not deliver the product until sometime in late 1986 or early '87.

Extra: Joe, you say you are already wired to accept, I presume, the token-passing ring.

Brophy: I guess in the home office we're probably 80% to 90% wired.

Colony: We've found there are about 150 to 200 token networks already installed in the U.S. It has been a big surprise how fast IBM is wiring accounts like Travelers.

Extra: Wiring with IBM cabling but using someone else's token network?

Colony: Wiring with the IBM cable system. Most users who have it are using it for 3270 cabling today.

Extra: There are non-IBM token-passing ring solutions that work, too.

Colony: My feeling is those will be irrelevant after IBM begins delivering its network.

Extra: Would you say they are they irrelevant right now?

Colony: They can be a short-term solution for perhaps one department of 20 to 200 people. If users want to

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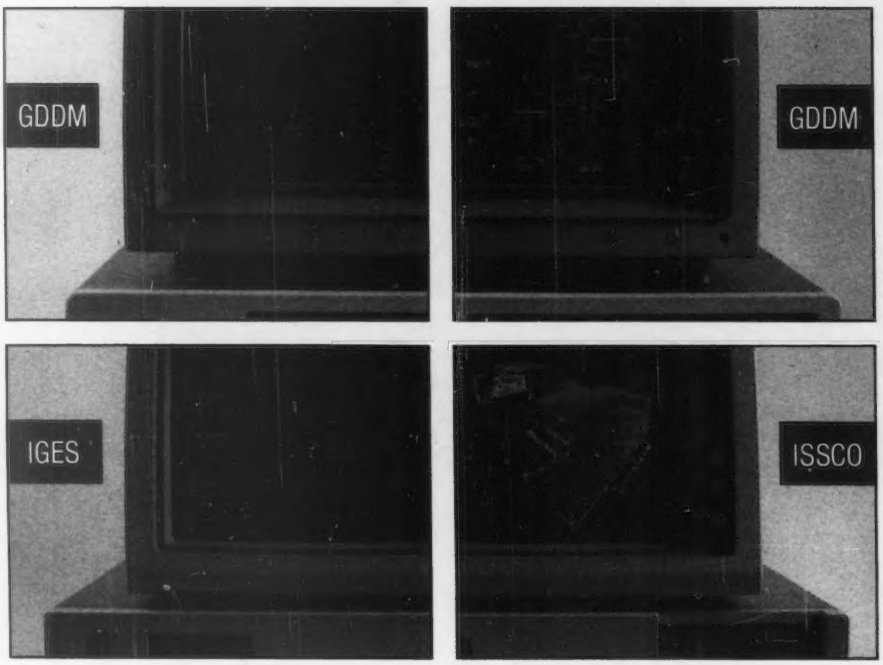

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get some education in local networking and also token access, and they have money to spend, it may be a good idea. But as a long-term solution, the IBM cable system will be the dominant force in the market.

Extra: That doesn't imply a long life for some of the current personal computer network vendors.

Colony: That's right. And in fact, IBM's National Accounts Division has refused over the last six months to sell the PC Network. They believe it's not strategic, it's a short-term product, an Entry Systems Division product, not a viable solution in the long term for large companies such as Travelers.

Brophy: I would agree.

Colony: What do you estimate the cost per year would be for personal computer, interfacility communications at Travelers?

Brophy: It's across our SNA backbone, and personal computers are contributing only an insignificant amount of traffic.

Colony: How many nodes are on your SNA network?

Brophy: We have about 20,000 devices on it. We ran out of address space about two years ago. We were faced with the option of starting up a second network. We had to put in some additional [IBM] 3725s, and we had to do some creative wiring between them to get around the addressing limitations of SNA. We were an [Early Support Program] for [Extended Network Addressing], and it is implemented.

Colony: You've got to be the largest SNA network in the country then.

Brophy: Maybe as an integrated network, yes. In 1975, we had six different networks and network protocols. The economics were such that it was very attractive to convert to a single network and develop the protocol conversion software we now have.

Extra: How many local-area networks do you have?

Brophy: Four types. I'm sure there are more — we have a lot of creative people around here. Then in each field office we have the R loop, so you could argue that we have 550, if you count our installed base of 8100s.

Extra: What are the four types?

Brophy: Our standard is the IBM PC Network. The first one was installed as a test facility as soon as the network came out last fall. Fundamentally, we're thinking PC Net for the immediate future, but we have others, and some are in experimentation. For example, we have the 3Com Corp. Etherseries, the AST Research PC Net2, a couple of Nestars.

Colony: We've found that one reason users weren't installing networks was that the cost to connect was too high. They wanted a cost-to-connect that is 10% to 15% of the cost of the workstation attached. Are those accurate percentages for you?

Brophy: I can't relate our costs directly to your percentages. A driving factor for us was the cost and delays of pulling cables and the other problems of moving a terminal from point A to B. That's one of the reasons we installed super wire. I'm not thinking in terms of percentage costs; I'm thinking in terms of accommodating a transient end-user community.

The competitive pressures in our business caused us to reorganize. We've got 4,000 independent agencies interfacing with our mainframes. Those transactions now bypass our field offices.

So we found it very convenient to consolidate from 300 field offices to 16 processing centers.

Colony: When IBM announced the PC Network last summer, I beat on them because I said they were now offering two cabling schemes. One is the special cabling for the cable system and then broadband for the PC Network. Are you installing broadband cable behind walls for the PC Network, or are you putting it in the floor or ceiling so you can rip it out when you go to the cable system?

Brophy: It's a temporary installation, out of the way.

Colony: That's what I thought. How many nodes are on the networks?

Brophy: The largest one has 15 personal computers connected to it and the smallest about eight.

I think it has been a significant advantage to be a one-vendor shop because we can free up good people to work on business as opposed to interface problems. If we can eliminate these interface problems, we can get on with real office automation.

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EXTRA

Extra: Early on in the conversation, you brought up network software, George. What is on the market now, and what you would like to see in terms of optimized network software?

Colony: Most of the networkable software out there today is running in the Ethernet environment — from companies like TCS Software, which writes accounting packages to run under Ethernet. My feeling is that most vendors in the Ethernet environment are going to be belittled by the IBM cable system. I'm expecting to see a new fleet of third-party software vendors who are going to write around the cable system and, perhaps in the early going, around the PC Network.

The major point here is that what is coming will be primarily in the area of licensing software. I expect to see the personal computer software residing on a departmental system and being distributed from that point.

In the area of distributed data base for personal computer users, I think that's going to be the second major area in networkable personal computer software.

The third point here is bridge software, enabling personal computer users with specific documents to move up to a departmental system and then bridge from there up to mainframe or Disoss or Document Interchange Architecture/Document Content Architecture (DIA/DCA). A good example is Digital Equipment Corp.'s External Document Exchange, or EDE, which is an exchange between the All-in-One environment through the VAX up into Disoss with full revisable form text DCA. That's the type of software we really see coming. I consider DEC to be the leading developer of what I call "IBM bridge software."

Extra: Is bridge software the same as gateways?

Colony: It's a question of semantics. I consider gateways and bridges the same thing at this point.

We are observing a number of large companies out there, such as Equitable and American Express, who are in a multivendor environment. They're telling me that one of their major problems is the bridge — how do they get a DEC document over to IBM or Wang documents over to IBM? One thing I've advocated is going with one vendor because then you won't need all these bridges. I will presume Travelers is pretty much a one-vendor shop. Do you consider yourself at an advantage or disadvantage in communicating documents?

Brophy: I think it has been a significant advantage to be a one-vendor shop because we can free up good people to work on business problems as opposed to interface problems.

In 1970, we had no IBM equipment. We had mainframes from all the other vendors. We consumed a great deal of energy interfacing. Many of our top technical people are doing business jobs now.

I'm not sure it's going to be that way in the future. As AT&T gets into the act more fully, I believe IBM will open up its architectures because it's in the company's best interest to do that. If we can eliminate these interface problems, we can get on with real office automation and all the good things that are going to flow from that — and we're going to buy more IBM equipment in the process.

Colony: As a one-vendor shop, do you feel you have been burned on products such as Disoss or the 8100?

Brophy: I told IBM I was very disappointed in the 8100. I'm not disappointed in Disoss — except to the extent it has been slow in coming. We've made a heavy investment in the 8100s, and we're going to begin phasing them out of operation in the next few years. Yes, I've been very disappointed.

We made a commitment to distributed processing technology to reduce communications costs and get better response time. I don't think we'd make the same decisions again in terms of 8100s, considering our networking expertise with microcomputers.

I am disappointed, but I wouldn't say we were burned, because the 8100 has been a good investment. We set out to achieve certain economies and productivity, and we achieved all that. More important, during the life span of the 8100 we changed our host computers three times. Some of the 8100s will be around for 15 years.

We've got a number of distributed applications that will be in production for another five years because they're doing the job. In terms of achieving business objectives, it was great; from the point of view of having a building block, a technology in place as a platform to build future technology on, it's been a big disappointment.

Colony: Is it possible you are gun-shy about departmental computers because of the 8100s?

Brophy: It's not a question of being gun-shy. I'm not adverse to departmental computing if it makes sense. I just don't see the advantage. Why put in three tiers when we can do what we have to do with two?

Colony: One of the issues that comes up is that personal computer users don't trust the DP manager to deliver the resources they need at the mainframe level. So those users want to own a machine that sits in a corner of their office and that they probably

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buy and manage. They'll get some resources from the mainframe, but they want to be able to control their local resources. Is that a factor for Travelers or not?

Brophy: It may be — if you could get inside the head of each end user, they may think that way. But certainly it's not manifested. You can't do your job here without having access to a mainframe.

Basically our people are knowledge workers. We've got 2,500 data bases; we've got 2,800 disk drives; we've got five mass storage systems; I can't tell you how many decision support systems we have which are host-based, driven by end users.

We made a decision in 1979 that we would no longer program reports. We said that it was an end-user responsibility. If anything, I think we have the brakes on, trying to slow down host utilization — not the personal computers. We're trying to encourage personal computers at home and the office, providing assistance through the computer store.

What we're trying to put the brakes on is utilization of our host computing requirements. Personal computers create a latent demand for host resources. I don't think people are concerned about central data processing because we've been the biggest supporters of the personal computer phenomenon and encouraged end users to do their own thing.

Colony: By our accounts, we believe 75% to 80% of the personal computers in the Fortune 1,000 are, in fact, IBM.

Extra: Do you find that the remainder are not being integrated through networks?

Colony: Well, another 5% are Compaqs and other compatibles. The second most installed personal computer in the Fortune 1,000, believe it or not, is Wang. Most of those Wangs are attached to VSs, so they are communicating — with Wang equipment, of course, not with the IBM mainframe.

Brophy: Wang has a great product. The reason I know is that my daughter is a saleswoman for Wang. Unfortunately, Wang has not penetrated our environment, although they have put products in our corporate store.

It's not the quality of the product. I think it's just the momentum of having so many Personal Computers and so much dependence of one Personal Computer on another. So much of our environment is integrated — work is developed on one Personal Computer and displayed on another.

Colony: My baseline comment about Fortune 1,000 personal computer integration is that it's going to revolve around the departmental solution. You're going to have a departmental computer that is going to act as the gateway to the mainframe above. The personal computer will be moved through that departmental system when it communicates to higher level systems. Joe and I are directly opposed in this area.

Brophy: I am not disagreeing. IBM people, from what I've seen from the representatives here, are enthusiastic about the concept of departmental computing. I have no disagreement that a lot of companies may very well use a departmental computer like the System/36.

I think when the dust settles, in many situations it's not going to be necessary to have one. Micro-based products are going to have sufficient capability that you really won't need a departmental computer.

Colony: My scenario for the seven- to 10-year time frame is that communications links will improve so much that we will have basically one very intelligent device in our personal computer talking directly to that very large computer someplace in the country. But now, while the communications costs are still quite high, it will be important to take a piece of that mainframe and shove it out to the local site.

Brophy: You've been saying departmental host. If you would substitute the words "departmental gateway," I would not disagree with you.

Colony: But it's not just a gateway, it's also running a local data base, distributing micro applications, acting as a file server and maybe even as a printer server. It's a lot more than just a communications gateway.

Brophy: I would suggest you look at what IBM is doing as far as the gateway. It includes all of the above. I think the problem is only within IBM, and it has to do with the differential between the System/36 to 38 series and the Series/1. The Series/1 as a gateway does everything you said.

Colony: Give me a good data base running on the Series/1 that Personal Computer users can actually get good quality out of.

Brophy: IBM hasn't announced it, and I'm not going to announce it for them.

Joseph Brophy and George Colony were brought into dialogue for Extra *by National Trade Productions of Alexandria, Va., and Intech, the annual integrated information technology conference held in San Francisco Aug. 26-29.*

"Two ads in Computerworld Focus flooded us with inquiries on our new micro product, EnerConnect."

EnerConnect is the second major micro product from Enertronics, developers of the successful EnerGraphics package. As the ad for EnerConnect says, it is "... the first software package that puts mainframe graphics capability into the hands of anyone with an IBM PC ... or 3270 PC."

When it came time to announce EnerConnect, Randy Andes decided to use *Information Week*, *Business Week*, and *Computerworld Focus*. As Randy puts it, "... we knew *Computerworld* reached the people we need to talk to from past ads for EnerGraphics, and we decided to test *Focus* because, as the name says, each issue focuses on a topic. So, we could select an appropriate editorial environment."

The results? "*Computerworld Focus* has produced the most response of any of the publications used and, by far, the best response. In fact, total response (via the 800 number) has far exceeded expectations. We further intend to continue to tie into *Computerworld's* editorial calendar where appropriate."

The moral? Well focused advertising in a well focused medium will produce the best results every time.

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Randy T. Andes, Director of Marketing, Enertronics Research, Inc., St. Louis, Missouri.

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Gearing software to networks

By David Lytel

Some software vendors are rushing to meet the growing installed base of networked micros. And some vendors are running the other way.

When micros were stand-alone devices and networks only existed for minis and mainframes, each micro user had to buy his own copy of a software package — plain and simple. But now that microcomputer networks are sprouting up, customers are starting to demand multiuser and network versions of the software they've known and loved.

Some software vendors are obliging, but others clearly are not. Conflicts over site-licensing and fear of lost profits have generated more than a little foot-dragging.

But in the offices of vendors who have been ahead of the market in offering application software for networked micros, jubilation prevails — their moment has arrived.

Vendors of data base management systems have the most adjusting to do, while word processing and spreadsheet vendors enjoy an easier task. Since word processing and spreadsheets are by nature single-user programs, vendors need only provide file-level lockout and ensure that all changes are transparent to the end user. Some

CW PHOTO BY O CONNELL/LAROUCHEUR

get away with even less, leaving file security duties to the compatible network operating system. And still there are few network versions of word processing packages on the market.

Keeping the status quo

Software and data sharing traditionally has been handled via site licensing in the mini and mainframe worlds. Vendors license software to a network, rather than an end user, and then don't worry about who is connected to that network. But many micro software vendors are struggling to maintain the status quo — the revenue that comes from licensing individual packages.

Vendors can't afford to have network versions of their software, but users can't afford not to. Using a single-user version on a network puts users in violation of their licensing agreement and jeopardizes their data. Without file locking and record locking as well as appropriate levels of security, data is easily corrupted or lost.

Vendors can't afford to have network versions of their software. Users can't afford not to.

One word processing software vendor that has worked out a network policy is Samna Corp. Samna's software is marketed directly to major accounts, which has forced the Atlanta company to develop a network policy quickly.

"We would've lost a lot without a network version of our software," says Marketing Vice-President John Day. Samna introduced network versions of its word processing products last spring and sells them based on the number of network nodes that will be sharing the product. The price of the three-user version of Word III is $1,250 and scales up to $5,750 for as many as 15 users. The more powerful Samna+ is priced at $1,550 for three users and $7,250 for 15.

Multimate International Corp. announced a network version of its popular Multimate word processing package in May and began shipping in July. "It was basically a response to requests from our Fortune 1,000 customers," says Marketing Vice-President Suren DerAvedisian.

The idea behind the multiuser version is that it be indistinguishable from the single-user original from the user's standpoint. Single-user versions of Multimate 3.3 and the more capable Advantage product will be priced at $495 and $595, respectively, and $995 and $1,195 for versions licensed to a three-user network. The cost for each additional user will be $295.

These two are the only leading word processing vendors who have made specific arrangements for networks. Microsoft Corp., for example, has not yet announced a network version of Microsoft Word or Multiplan. As the developer of the operating system for the IBM PC Network, the company is "heavily committed to networks," according to Product Marketing Manager Dave Melin.

But Microsoft continues to consider placing its software on a file server as a violation of the licensing agreement. When the company does announce a network version early this fall, Melin says, "I doubt we'll be making specific changes to our products for networks other than our own MS Network/PC Network."

Micropro International Corp. is equally tight-lipped about plans for network versions of Wordstar. Vice-President for Product Development Bill Crowell says, "The technical part has been resolved. It's the marketing part that is a tough nut to crack." In his case, marketing includes selling the idea of multiuser software to his retailers, who also have been accustomed to the one-user, one-package sales income and who are equally threatened by an additional loss of control through site licensing.

Compromising position

Software Publishing Corp. joins other companies who are hoping to pass the buck. Software Publishing has no network versions of its popular PFS series, which Director of Marketing Signe Ostby admits "is a bad position to be in." But the company also produces the Assistant series for IBM. Says Ostby: "We're hoping they'll solve the network licensing problem for us."

Ostby acknowledges that by not having a network policy, Software Publishing has put networked customers who might install the single-user versions on shared hard disks in an awkward position legally. But she does not foresee the company moving against those users. "We don't believe in prosecuting our customers," she says. "I think Lotus is shooting itself in the foot."

Lotus Development Corp., which has more than a million copies of its 1-2-3 and Symphony programs installed, is not only the leading microcomputer software vendor but is also the vendor most publicly resistant to developing a network policy. "They've been dealing with networks two ways," comments consultant Eric Arnum of International Resource Development, Inc. "Lawsuits and stonewalling."

Lotus has not only gone after customers who place their software on a file server but has also copy-protected

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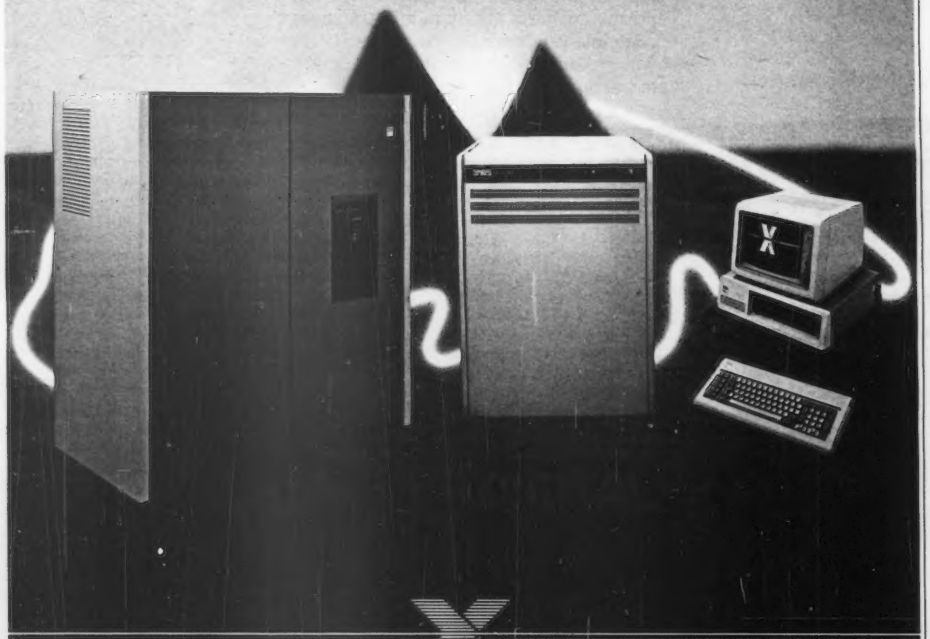

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certain parts of the programs so they cannot be loaded onto a hard disk. Lotus spokesman Jim O'Donnel reports that the company has "been meeting with key corporations and customers and hammering out arrangements on site licensing" and will announce that policy early in the fall. Communications marketing specialist Chris Noble warns, "We will still require one license per workstation in a network situation."

The new Symphony 1.1 will rely on its compatibility with MS-DOS 3.1 for many of the features required of a network software package. Rather than rewrite Symphony from the ground up, Lotus has written the interface so that the operating system will take care of record locking. With these steps, Lotus is moving with the rest of the software industry toward networking. Says Nobel, "We hope we never have to litigate again."

Vendors of integrated packages enjoy a special challenge. If the multiuser version is to achieve the goal of transparent networking (no functions from the single-user version lost), end users' editing changes will have even greater impact.

If User A raises a figure in User B's spreadsheet to reflect greater sales, the change will affect User B's bar chart as well. Large-scale accounting packages have built-in audit trails, but personal computer spreadsheet packages do not; without totally rewriting the software, there may be no way to trace the changes that have been made to a given file.

One vendor's research showed that 88% of network users actually run single-user software on their network, some with disastrous results.

One vendor's research showed that 88% of network users actually run single-user software on their network, some with disastrous results. Placing a single-user version of a DBMS on a file server can be a lot more than just a potential legal hassle. If the DBMS doesn't support the network's scheme to prevent two users from updating simultaneously, serious data corruption problems can develop.

Recipe for success

To run effectively on a network, a DBMS package must have — at a minimum — schemes to lock out other users when one user is changing a field or a record. To take maximum advantage of network features, a DBMS vendor can restructure the program from the ground up. Several vendors are moving to meet the growing demand for network data sharing with new DBMS packages.

Microrim will release a network version of its Rbase 5000 DBMS this month. Microrim's multiuser product will provide concurrent access and will be licensed on a per-file-server basis. The $2,100 price of the multiuser version is three times the cost of the single-user version.

Ashton-Tate, however, is not moving as quickly. It offered a multiuser version of Dbase II for sale for almost a year, then pulled it from the market in January. "Basically it was just a patched version of Dbase II," says Scott Brown, Ashton-Tate's technical public relations manager. "The developer had to do a lot of his own customizing and debugging to allow for record locking." The product was only available for one type of network, and Brown says the company found there was little interest in it.

"We haven't jumped on the multiuser bandwagon yet," he notes, "because we want to be able to take full advantage of the network environment when we're ready" — presumably when network hardware settles on a standard for software to follow.

Several smaller companies always have sold multiuser versions of their software and been ahead of the market, which is now arriving to meet them instead of the other way around. Florida software vendor Data Access Corp. markets a DBMS called Dataflex that has been multiuser since the product was introduced in 1981. It runs on 15 different networks and is priced at $1,250 per file server. Account Executive Diana Wilcox reports their shrewd anticipation of the market has yielded 22,000 copies already installed. She predicts 1985 will bring three times the sales of 1984.

One vendor with a very sophisticated understanding of the local network software market is Software Connections, founded in 1981 to target the network market specifically. Gary Kwok, product marketing manager, explains that during the design process, "data security is No. 1. You're now off the floppy, and a lot of people have access to your data and programs. There has to be a way to prevent hackers' tampering." According to Kwok, the DBMS should also provide levels of access for individual users to different files so that personnel files, for example, can be held confidential.

The other most important feature? "Believe it or not — ease of use. A network has end users at a range of experience levels. The user interface has to be easy enough for people who are used to PFS but at the same time offer more advanced features."

Kwok advocates finding software that has been rewritten for networks from the ground up. "It's nearly impossible to do a good job retrofitting. Audit trails and other security and privacy features — we haven't seen these with any retrofitted package."

Software Connections prices its DBMS, called Datastore:LAN, at $1,000 for five users and $2,000 for 16. "We tried per-user pricing," says President Buck Gee, "but it just did not work. It was impossible to police." The company's LAN:Mail Monitor electronic mail package can be used between networks as well — an advantage to software designed by a third-party independent.

Another sophisticated network software vendor is Fox Research, Inc., which began as a vendor of network hardware. Fox brought out a network version of its 10-Base DBMS in the spring of 1984 to run on its local-area network, called 10-Net. 10-Base is available for $895 in a version that supports up to five users.

User at the helm

To many software vendors, networking is a vexing problem. But at least one vendor is making a deliberate strategy out of calling it a nonissue. Lifeboat Associates, Inc.'s Chief Executive Officer Edward Currie insists that unless a vendor sells a product that demands concurrency, it should ignore the problem of multiple users and multiple copies and continue doing business as before.

"Oddly enough," Currie says, "we believe in that approach. We believe that networking will force software vendors to add value to their product, substantive value: life documentation and technical support and updated versions." He expresses the hope that software vendors will stop thinking of their product as a single diskette, a one-shot sale. In his opinion, the product includes updates, and a network version should be handled by the software vendor as just another update to provide for the customer.

In this line of thinking, the ability to copy and share software, rather than being a threat, has been a key element to the development of the software market. "The strongest form of advertising is still word of mouth," Currie says. "Our experience has been that many of our new users first came into awareness of our product by borrowing it from a friend."

To Currie, this kind of a customer-oriented approach is critical to the future of the computer industry. "We've lost momentum in this industry," he says. To wit, some observers are witnessing a generational change in the leadership of the software marketplace.

As Arnum of International Resource Development puts it, "The dominant software vendors in our present 16-bit IBM world may not be dominant in the local-area network world, in the same way that the vendors who led when CP/M was the dominant operating system are not the same people who are leading now that MS-DOS is dominant."

Senior Analyst Meg Lewis of Future Computing, Inc. says, "Opportunities are now being created for software vendors who will treat their corporate customers the way they'd like to be treated."

Since for many corporate users that means networking, the future seems clear. If the presently dominant vendors don't move to meet the demand for multiuser applications software, there are people in the wings who are ready to pick up those customers and move the industry forward.

David Lytel is a freelance writer based in Ithaca, N.Y., specializing in data communications.

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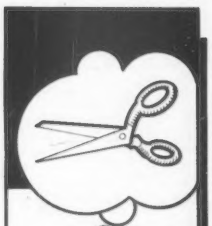

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EXTRA

Gateways

By George Elgar

Bridges and gateways give personal computer users universal access to shared resources and one-connection access to the host. Wait till they hear about hybrids.

Bridges and gateways are doing for networks what networks did for micros: eliminating isolated processing.

Today, the local-area network market is crowded with more than 50 vendors offering myriad topoiogies, access protocols and cabling schemes. Gateways and bridges are required to accommodate users demanding universal vertical and horizontal resource sharing.

The arguments over network architecture — baseband vs. broadband, CSMA/CD vs. token passing and so on — that stymied network development have to some extent calmed down. Custom applications software, "firmware" and intelligent sharing devices are solving these difficulties, freeing network installers to innovate further.

The issue now for the general user is: Will my personal computer run the applications I need and am accustomed to in a multiuser environment? As the market responds in the next year or so, the industry will see a virtual explosion of bridges and gateways.

There remains a great deal of gray area

in the distinction between bridges and gateways in users' minds, partly because the terminology is often used interchangeably. One definition holds that a bridge links two similar networks, whereas a gateway links two different networks.

In a bridge, the protocol passed between the networks is transmitted in its original format; no protocol translation occurs. Bridges can be used to increase the number of addressable nodes on a network or to link two geographically distinct networks.

The benefits bridges offer are substantial. For example, branch offices in Los Angeles and Chicago can send sales data from their respective networks to the main office in New York or perhaps request targeting data, via a bridge. One branch office can address the other directly, as another node on the network, without signing on to a communications service, dialing through a modem or learning new software commands and menus.

Smart router

Bridges now are a combination of both hardware and software. A typical purchase will consist of a "black box" that sits between the two network servers and is connected to each. The bridge has its own processor, memory and software, and its operations are transparent to the network user.

Bridge Communications, Inc.'s Gateway Server/4 product, for example, can be used to connect two Ethernet local-area networks located in the same building. The GS/4 sits between the networks, running two Ethernet cards and a shared memory card off a Multibus. Internal software allows the GS/4 to route data and commands without network users being aware of its interference at all. No additional software is required for the network nodes, and the bridge does not place an additional limitation on the number of users in the network.

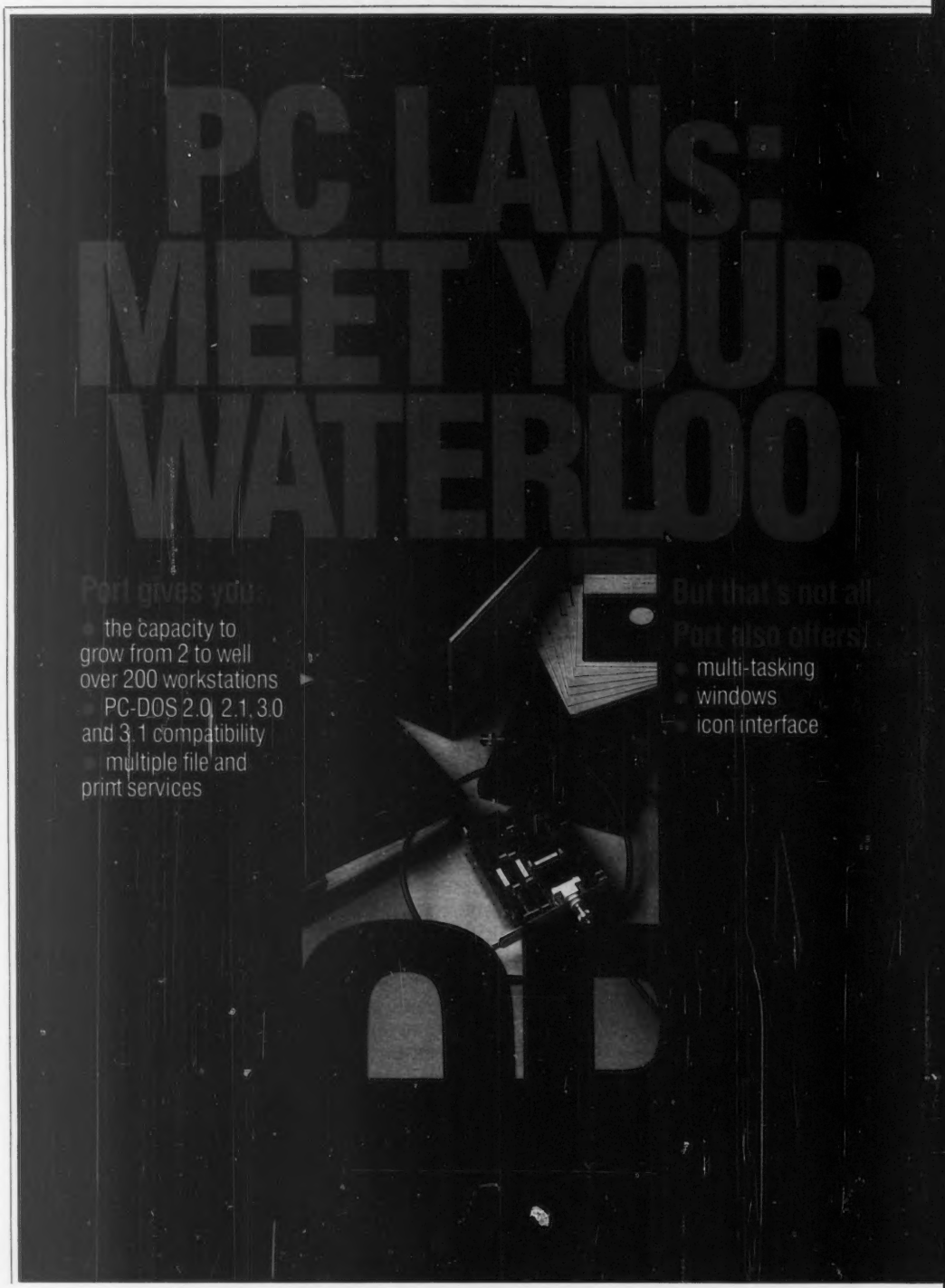
The same system could be used to supplement a single Ethernet network. If a very long Ethernet cable were stretched throughout a building, the network installer could choose to break the cable at a point and use the GS/4 to connect the branches.

Bridge Communications' GS/3 product, on the other hand, links Ethernet networks that are miles apart. A GS/3 box would reside at each network, and they would communicate via one of a number of standard communications carriers: telephone lines, T1 connections, microwave and so on. Again the network users are unaware of the transaction, except that the transmission's speed will be dependent on the carrier used. (It will, in any case, not match the 10M-bit speed of Ethernet.)

Further development of bridges will follow the traditional pattern for computer evolution. As the software becomes standard, much of it will be embedded in the hardware, and new facilities will be added. Current bridge products are sold as both standard off-the-shelf products and customized devices.

Although somewhat of a virgin industry in the eyes of users, bridge technology is commanding an ever greater proportion of the computer industry's attention. Several manufacturers offer products that are well established and tested. 3Com Corp. and Novell, Inc. both offer bridges to link their own local-area networks through telephone

The existence of gateways now becomes a factor in the type of local-area network users select. If communication to the outside world is crucial, a local-area network must be chosen not only on its own merit but also on its ability to run through an appropriate gateway.



lines. Other bridge manufacturers such as Ungermann-Bass, Inc. and Associated Computer Consultants provide bridges to connect their own and other vendors' similar networks.

Gateways go further

A gateway does what a bridge can't do — interface two dissimilar networks. Gateways translate one network protocol to another network protocol, bridging both hardware and software incompatibility. This advanced technology goes to the heart of the problems encountered in micro-to-mainframe/mini communications.

Gateways, like bridges, are combination hardware/software products based on powerful processors of their own. Pathway Design, Inc., for example, has recently introduced Netpath, a local-area network gateway that allows IBM Personal Computers and compatibles to communicate with IBM hosts through a dedicated Personal Computer XT. Besides the basic gateway functions, Netpath provides multiple sessions, customized presentation services and an option for multiple host gateways to one local-area network. The Netpath can communicate over dial-up, leased, point-to-point or multi-dropped lines.

In general, gateways are designed for transparent operations. Gateway users need not know the protocol or medium of the network from which they are requesting or sending data. Some gateways even take care of Ascii/Ebcdic conversion. Furthermore, the conversion may be to a protocol not normally associated with networks — Ethernet gateways to television or FM radio — so connections are not limited to micro-to-mainframe or network-to-network.

The emergence of gateway technology is, in many respects, a result of the closed IBM environment, which has traditionally not furnished outlets to other worlds. There was a strong impetus from users who wanted to connect their IBM equipment with hardware from other vendors. This pressing need gave rise to SNA gateways, which can connect local-area networks to IBM mainframes using Systems Network Architecture (SNA).

Besides adding convenience, an SNA gateway enables microcomputer network users to access mainframe applications, data and peripherals at much lower costs than a direct link. Without a gateway, each personal computer must have its own 3270 hardware card, coaxial cable and mainframe controller port. The SNA gateway requires no additional hardware for the personal computer and needs only one connection to the host, since all data is sent through the central gateway box. The benefits of 50 users on a local-area network sharing a single port on a mainframe are obvious.

X.25 gateways solve more generic connection issues. X.25 is a packet-switching protocol widely used for long-haul data communications. X.25 gateways allow a local-area network to connect to public data networks that use the X.25 protocol, such as GTE Telenet and Tymnet. Again, by using a common passage, the gateways reduce the cost and complexity of connecting dissimilar environments.

Because gateways are used to link two different local-area networks, such as a 3Com Etherseries network and an IBM PC Network, they may eventually help ease the standardization crunch. If and when IBM becomes the industry standard in networking, local-area network manufacturers like Novell and 3Com may provide gateways to IBM's network instead of radically changing their own architecture to conform to IBM specifications. This development should give some relief to users and software vendors alike who are afraid to commit to a single architecture.

It is doubtful that a single universal data communications solution will ever emerge, and in fact, one may not be desirable. No single protocol can accomplish all the required functions. An insistence that all hardware must conform to a single protocol seems impractical; thus, gateways are as inevitable as they are invaluable.

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Advanced User Interface makes operation easy

Port combines these sophisticated network capabilities with an icon-based user interface that's responsive and easy-to-learn.

Think of Port's working environment as a building that contains many rooms (e.g. Lobby, Office, Supply). Each user can have his or her own personalized office containing icons (e.g. Browse, Mail, Back-up). An activity is initiated by simply selecting the appropriate icon. Icons can even start PC-DOS applications. A mouse can be used to further simplify the procedure.

Multi-tasking/Windowing
With Port, up to 12 activities can operate simultaneously at each workstation. For example, you can run your favourite DOS program, print a document, browse a file system, and send electronic mail – all at the same time. Each activity has its own window which you can display or hide while the activity continues.

A design for the future

Port's design is the result of ten years of research at the University of Waterloo. Port solves the problems of PC LANs. That's why corporations such as IBM Canada, Crowntek and Computer Corporation of America sell products based on Port.

Continuing research and product development will ensure that your Port network always keeps pace with the future. Product enhancements are provided through Port's Software Update Service.

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The recent Ungermann-Bass/Microsoft Corp. joint gateway offering may be indicative of trends to come. The product combines the former's Net/1 and the latter's PC Net. The combination hardware/software, bridge/gateway points to a series of joint ventures and mergers resulting in the blending of the two technologies.

Another likely trend will be price drops. Just as the cost of microcomputers and local-area networks has decreased over time while performance has increased, gateways will become both more affordable and effective. As their popularity and acceptance increases and more vendors break into the market, gateways in the $10,000 to $15,000 price range will become available at a lesser cost.

Because gateways are used to link two different local-area networks, they may help ease the standardization crunch.

At the moment, bridges and gateways are being distributed almost exclusively through specialized dealers or through the manufacturers themselves. The complexity of the technology prevents most end users from selecting, installing and maintaining the hardware independently. However, if local-area networks are any indication of future trends, it won't be too long before gateways and bridges may be found in retail outlets, making them even more available to a broad range of customers.

Hybrid networks, perhaps the network architecture of the future, hinge on gateways. Hybrids combine a variety of network environments and protocols in a single network, utilizing each type's strong points to the fullest advantage. For example, a single hybrid network could be composed of a broadband backbone with a dozen or so dissimilar baseband "ribs" running off of it and a fiber-optic link to Europe.

Bridge Communications' GS/6 is already available for such baseband/broadband interconnections. Under this configuration, users can be logically grouped by department to capitalize on the higher speed, lower cost and easier maintenance of Ethernet and still communicate over a broadband backbone with other departments up to ten miles away.

Hybrid networks will also help simplify long-term network planning. Multiple channels on broadband cable can be used to transmit a variety of mediums. Thus, the ability to transmit voice, data and video is immediately available to accommodate changing communications requirements. Other examples of hybrids expected to emerge will bundle voice, data and video environments, with AT&T the most likely leader.

Added pressure

Gateways are beginning to have a real impact on the network industry. The existence of gateways, for instance, now becomes a factor in the type of local-area network users select. If communication with the outside world is crucial, a local-area network must be chosen not only on its own merit but also on its ability to run through an appropriate gateway.

Although gateway technology is rapidly becoming more available, gateways and will not exist to and from every network. Gateway manufacturers will focus their technology on major local-area network players such as IBM, AT&T and 3Com, placing added pressure on the minor network players who can no longer operate in a stand-alone environment.

Of course one of the main factors holding back mass acceptance of gateways in the marketplace has been the delay in the necessary prerequisite — lots of local-area networks. Meanwhile, it will be the value-added dealers, value-added resellers and systems houses that will lead the way for users, particularly as long as sharing resources involves overcoming unfriendly user interfaces.

To the user, the issue boils down to information transfer. The end user's involvement in bridges and gateways should be as transparent as electrical outlets in the home. There is now no technical reason why one computer's resource cannot be shared by another, whether the second computer is a clone of the first or a completely different kind of computer — and no matter how remote.

Incompatible protocols or architectures can no longer be seen as stumbling blocks. The hardware is all there. It is now up to the software industry to develop reliable, practical programs to control and take advantage of this resource sharing, while the hardware industry reduces the user's responsibility to entering an occasional command on the keyboard.

George Elgar is president and chief executive of Microclear, Inc., a New York-based computer consulting and software firm specializing in turnkey services and networking. He is also editor of "Micronews/Views," a monthly software industry newsletter.

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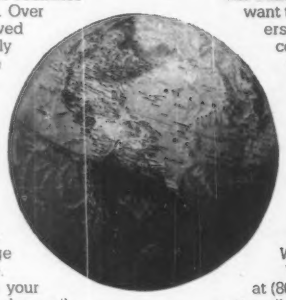

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User Views

Hidden costs of networking

By Girard Liberty

Not until you start networking and interfacing personal computers to a host do the major hidden costs of personal computing begin to accrue. These costs include micro-to-mainframe link software, centralized direct-access storage devices (Dasd), shared data base systems, host CPU cycles, telecommunications hardware, network services and, of course, staff support. Such costs can easily become two to three times greater than the original cost of the personal computer and its software.

At Monet, we installed a micro-to-mainframe link called Panlink, Pansophic Systems, Inc.'s adaption of Micro Tempus, Inc.'s Tempus-Link. At a cost of $800 to $1,200 per user, depending on the number of concurrent users, Panlink allows us to use mainframe packages such as Pansophic's Easytrieve data base retrieval language and data dictionary tools through a transparent distributed processing link. Users can either download data for processing on their micros or upload an updated file without needing to know the intricacies of file access techniques or CICS.

The hidden costs don't remain hidden for long after the purchase of micros. The mainframe link, among other things, enables our end users to expand their storage capacity through the use of virtual diskettes residing on central Dasds. During an early experience with this new link, one of our personal computer users managed to consume nearly half of an IBM 3375 disk drive! We have since learned to limit both the size and number of virtual diskettes any one user may have, but we are under constant pressure to raise these limits.

A more subtle cost is the use of mainframe power. As the number of active links grows, cycles are quickly gobbled up. We initially ran Panlink under CICS. In vying for the same address space, our Panlink users were slowing response times for our normal CICS users. Transmitting data at relatively slow speeds was "stealing" CPU cycles.

The resource drain on both Dasd and mainframe cycles should not be overlooked when developing capacity plans. We are now running Panlink under TSO, which has a lower priority than CICS. Currently, we give our MIS applications development personnel and our personal computer users the same priority. Under TSO, however, we have the ability to modify individual user priorities as circumstances dictate.

As more users seek access to mainframe data, we are also finding a greatly increased demand for MIS services. Since we do not allow personal computers to interface directly to production data bases, our end users are pressuring us to provide them with subsets of data that they can download and manipulate. It requires central MIS effort to extract, summarize and format data that our personal computer users can access directly. Employing the staff to provide this service is another cost often overlooked in planning to support personal computer users.

In all, Monet is getting excellent value from its personal computer use. In a recent survey, only 16% of the personal computer users could pinpoint hard dollar saving, but 80% considered the value excellent or very good.

The benefits most frequently cited were work eliminated, return on time and improved decision making, quality of life and competitive edge.

In central MIS, our backlog continues to be heavy, which is surprising in light of the high percentage of departmental micro applications. I believe that pent-up demand existed prior to the proliferation of micros. Users had simply stopped asking for MIS help when the backlog got too large. Most users of MIS services didn't understand the capability of computerized systems until they had the opportunity to develop their first "personal" application.

Girard Liberty is director of MIS for Monet Jewelers of Pawtucket, R.I.

Priced out of the promised land

By Dennis Bizeray

The full costs of an integrated network wouldn't be an issue if we could easily show a realizable offsetting cost saving, but we can't — easily — do that.

Of course, all of us seasoned DP professionals know in our bones that the information age represents profound qualitative changes in the way business can be conducted. Everybody says so, especially the journalists, the marketers, the gurus and the consultants. And we all know someone whose brother's neighbor already enjoys this promised land.

But proving the benefits before incurring the costs turns out to be no easy matter. If we can't talk the benefits up, maybe we'll have to wait for the costs to come down.

At my place of business, we have a formal policy controlling the purchase of micros, and we track what each one is used for. The policy recognizes that micros are not inexpensive when fully configured, endowed with software and equipped with links to our mainframe-based synchronous communications network. They become even less inexpensive when we try to establish companywide standards.

Strictly speaking, we are not supposed to provide a micro to anyone who can't show a clear, matching cost reduction up front. "Merely" saving people time in getting their jobs done doesn't count — there must be a bottom-line saving.

But in practice, we recognize that it takes time to develop benefits, and we allocate micros on a provisional basis to those who can state a decent case. Then we extract a quarterly rejustification for retaining the micro and its complement of software.

We like to imagine fully equipped micros with color screens replacing most of our on-line terminals, with each micro able to access our mainframe (a Sperry 1100) and auxiliary systems (DEC, Prime and others). We'd like to provide multifunction workstations with workmanlike integrated software, too, but we'd need the capacity and I/O speed of hard disks with streamer tape backup or file servers and local-area networks.

Our networking requirements would then threaten to outrun our ability to install and continually modify, maintain and troubleshoot our systems, let alone allocate and justify the costs. We can't afford open-checkbook computing for the rank and file, and the real present-day costs of all the good stuff we'd like to do is way too high for most of our potential users to justify.

We suspect we're not alone in taking hard-nosed corporate attitudes toward costs. If the concern that costs be demonstrably offset by benefits is widespread at the grass-roots level, then maybe the next phase of microcomputer evolution will not begin until fully featured micros — with built-in speed-sensing multimode modems, hard disks with streamers and truly integrated software — are much more aggressively priced.

Certainly we haven't reduced the load on our mainframe by installing micros. Such movement as we are able to make toward a fully integrated, corporatewide system will be accompanied by a significant increase in mainframe load as network traffic builds up and the mainframe application base swells. Our fourth-generation language (Sperry's Mapper) really does live up to expectations and is the vehicle by which most new applications are mounted, but it certainly doesn't lighten the mainframe load.

The on-line networking of micros, and the growth of on-line applications in general, now concentrates processing into the normal hours that people work, meaning that our prime-shift loadings could triple within our planning horizon. You can't blame the micros for this situation, but they are an integral part of the whole scenario.

And that perhaps is the most significant change — how quickly micros have emerged as key system elements. Now, if only we can get their costs into proper perspective.

Dennis Bizeray is director of MIS for Nova Scotia Power Corp. in Halifax, Nova Scotia.

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Market Trends

Satisfied customers

By Harry Henry

A survey of 265 communications managers at U.S. user organizations found a large installed base of micros waiting to be networked. User attitudes seem to be: "Now that we went on a spending spree and bought all these micros, let's do something with them before we buy any more."

Information systems managers are now thinking more economically about how better to utilize current resources to satisfy end-user demands. The local-area network solution is popular — 40% of respondents currently have installed a network, and another 29% answer that they are planning do so.

Results of the survey, conducted by the Market Information Center of Framingham, Mass., peg the following as the top three reasons for implementing a local-area network:

- To share the data base
- To share hardware resources
- To see a return on investment

These issues do not involve productivity, standards or stringing cable; they are practical issues (Figure 1). Users are looking for products that can help them manage their current resources more effectively.

The satisfaction level of current users with their networks is high — 74% indicate their network met their expectations after installation (Figure 2). Apparently the user community is finding solutions to networking problems with current products. Vendors may not agree on standards, but users report the products are working and serving their purposes.

This finding may surprise market watchers observing fairly slow growth rates. Because relatively few companies have installed local-area networks, it appears there must be something technologically wrong with the networks. This negative attitude probably stems from the installation stories. Nearly every company suffers installation problems, however minor, and these problems continue to be reported.

The four major problems users encounter most often are software support, cabling, resource limitations of the local-area network and, finally, the user inertia factor (Figure 3). Yet the same high percentage — 73% of those surveyed — would recommend their systems to other users.

Users are actively looking for the IBM answer. Less than 10% of companies with networks installed indicate IBM as the primary vendor, but among companies planning to install a local-area network, more than 20% (twice as many as the next vendor) will consider IBM in their product decision. Other vendors being considered include Ungermann-Bass, Inc., Digital Equipment Corp., 3Com Corp. and AT&T, with Sytek, Inc., Novell, Inc., Corvus Systems, Inc. and 3M Co. not far behind.

The two major suppliers of installed systems are DEC (with the Ethernet influence) and Sytek (with an IBM tie-in). Following them are IBM, Wang Laboratories, Inc. and others. Nine percent of users develop network solutions internally.

While the vendors and standards committees continue to sort out issues involved in network technology and interfaces, customers must deal with choices regarding wiring costs, protocols, cabling media. Their buying decisions will make users the final judges of the products' success and utility.

Judging by outward appearances, communications managers are managing the business of local-area networks quite nicely. Systems are being installed, end users appear satisfied, and the market (at least so far) is being driven by the need to use resources effectively. This purchasing pattern contrasts with the "micro fever" of the past few years, when many micros were purchased without careful attention to how they would be used. As the market matures, so do the products within it. The users are exercising their considerable influence to good effect.

Harry Henry is a cofounder and principal of The Market Information Center, a Framingham, Mass., market research and consulting firm that specializes in vertical markets and communications.

Assessing network purchase

Reasons for Implementation	Point Value
Share data base	111
Share resources	89
Economy	51
Increase system speed	34
Ability to move workplaces	32
Connect differing devices	31
Mainframe link	30
Expansion	24
Increase productivity	24
More efficient operation	24
Link micro to micro	19
Users more access	18
Electronic mail	16
Reduce CPU overhead	13
Technology became available	12

Source: The Market Information Center, Inc.

Figure 1

Measures of satisfaction

	Number	%
Did it meet expectations (after installation)?		
Yes	73	74.5
No	9	9.2
Undecided	16	16.3
Total	98	100.0
Would you recommend network product?		
Yes	71	73.2
No	6	6.2
Not sure	20	20.6
Total	97	100.0

Source: The Market Information Center, Inc.

Figure 2

Installation snags

Single Biggest Problem	Number of Mentions
Software support	10
Cabling	7
Resource limits	5
Getting going!	4
Hardware incompatible	4
Having users use it	4
Weak communications support	4
Disk problems	3
Price	3
Vendor support	3
Application programs	2
Diagnostics	2
Moving users	2
Multiple vendors	2
No time to learn	2
Printer support	2

Source: The Market Information Center, Inc.

Figure 3

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Market Trends

The multiuser alternative

By Andrew Chatha

Multiuser microcomputers, though available for several years, just recently have begun appealing to a broader audience. New multiuser systems from IBM and AT&T, the two companies with the greatest market share, are mainly responsible for gaining users' attention.

Using multiuser systems, corporate business managers can share information and resources without the difficulties of networking: fluctuating industry standards and tenuous compatibility between micro brands.

Once multiuser micros were overshadowed by personal computers in the corporate environment. But the spread of personal computers during the past two years itself quickly revealed the inherent limitations of these single-user systems. The need to share data and software as well as expensive peripherals sent users looking for alternatives.

As it turned out, users' findings created a new level of interest in multiuser micros. In many cases, multiuser systems run more efficiently than a mass of workstations. Personal computers connected by local-area networks can prove inadequate and user-unfriendly.

In practice, the choice between networked personal computers and a multiuser system depends on the investment a company already has made in equipment and on the types of applications that will be performed. Multiuser systems can often be assembled at a lower cost than a local-area network with the same number of workstations. But a local-area network is a good alternative for companies that have already made a substantial investment in personal computers, since a network represents only an incremental expense.

Lack of standardization in local-area networks has also contributed to the high growth rate for multiuser systems — almost 52% during 1985 and higher during 1983-1984 and before. IBM's token-passing local-area network is being eyed as a possible standard, but production units may not be available for another two years. Right now multiuser systems vendors are cashing in on users' reluctance to purchase networks before the IBM version becomes available.

Multiuser systems best serve applications that require users to access a centralized data bank of shared information simultaneously, such as an inventory control system. Networked systems, on the other hand, are more efficient in applications such as electronic mail, where information must be passed back and forth among a large number of end users.

A drawback to multiuser systems is that they tend to be confining; workstations must be within a few hundred feet of the computer. Moreover, everyone's work is interrupted when the central processor of a multiuser system fails. Networks are less vulnerable to single system failures, span greater distances and offer a wider variety of features.

Because they are fully developed already and are currently less expensive, multiuser microcomputers will continue to challenge network-based personal computers through the rest of this decade. Shipments of multiuser systems will increase sharply over the next five years — from less than $4 billion in 1985 to over $12 billion in 1990. However, as communications compatibility issues are resolved and more products become available, network-based systems will prevail.

Andrew Chatha is manager of the computer division at Venture Development Corp., a Natick, Mass. market research and industry information firm. He recently directed several market studies on computer and communications products.

MITCHELL J. HAYES

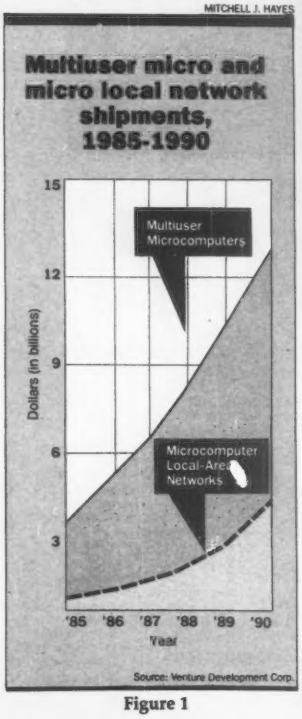

Figure 1

eForum is a simple cost-effective way to tie together PCs.

fo · rum, n. (pl. FORUMS) 1. A public meeting place for open discussion. 2. A medium (as a newspaper) of open discussion or expression of ideas. 3. A public meeting or lecture involving audience discussion. 4. A program involving discussion of a problem by several authorities.

*eForum designed by Marcus Watts, Copyright 1984, Network Technologies International, Inc. (NETI).

Electronic meetings continue the automation of knowledge transfer which started with electronic mail.

Electronic meetings are an extension of the communications revolution which started with electronic mail. It takes seconds to send a letter using electronic mail instead of days via regular mail. Certainly e-mail is a giant step in automating correspondence between two people.

eForum goes yet further to provide immediate communications automation. But for groups. It creates electronic meetings which allow attendees to participate in discussion using the dynamic ebb and flow of points, counterpoints, comments and conclusions just like in-person meetings.

From an economics point-of-view, eForum is the most cost-effective method for bringing together the best minds in your company to meet on key issues — without the price of a single plane trip, the aggravation of schedule conflict or time-consuming delay.

eForum is a communications breakthrough product.

You can bring the information created with Lotus 1-2-3 and other individual productivity tools and share them with the other meeting members.

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Vendor Views

A random selection of local-area network and micro-to-mainframe software vendors were asked to comment on their products, corporate strategies and the direction of their markets as a whole.

Network vendors

Ungermann-Bass, Inc.
Santa Clara, Calif.

"We don't view personal computer networking as enough," declares James Jordan, executive vice-president. "You've got to offer a communications system for the whole corporation. We are not interested in selling five-station network clusters."

Ungermann-Bass produces two Personal Connection cards, either of which can be used to link personal computers to its Net/One local-area network.

"What Ungermann-Bass believes," Jordan says, "is that the personal computer is the universal workstation of the future. If you are going to offer general purpose local-area networks to corporate users, you better be able to link personal computers."

The company can configure a small network, but the target market is the corporationwide Net/One marketplace with Personal Connection acting as an extension of Net/One.

Ungermann-Bass allows greater flexibility than competing companies, Jordan says, with the possibility of connecting to varied networks (such as baseband Ethernet or broadband networks), use of different media and compatibility with both the Microsoft Corp. MS-DOS 3.1 networking standard and an IBM Basic I/O Subsystem (Bios) interface.

He reports that the coming months will see the company offering additional functionality for personal computers and more interfaces with IBM 3270 devices.

AST Research, Inc.
Irvine, Calif.

"We produce a departmental local-area network, AST PCnet II, that could handle 160 users, but typically is used for five to 20 users," explains Mark Stieglitz, director of local-area network marketing. "It's easy to install, even for nontechnical users." Connections are simplified through use of telephone-type RJ11 jacks and twisted pair wiring.

"Our features include an [IBM Systems Network Architecture] gateway for bisynchronous communication with a host. We supply software for printer sharing and file sharing on a personal computer, which is used as a nondedicated file server. That's important when people have perhaps five personal computers and don't want to make a big capital expenditure for a new personal computer.

"We also use the same [IBM PC-DOS] commands that would be used on a single-user system, so a person doesn't have to learn a new set of commands to use the network," Stieglitz adds.

AST has installed between 15,000 and 20,000 PCnet nodes, including an earlier version of the network, according to Stieglitz.

He also points out that AST will focus future development on compatibility with IBM's PC Network, rather than with IBM look-alikes, because that will be the benchmark by which compatibility is judged.

Stieglitz compares the network compatibility issue to the situation with IBM's Personal Computer, where use of the IBM Bios was the key to compatibility.

3Com Corp.
Mountain View, Calif.

Roselie Tobes, vice-president for marketing, reports, "We have a series of products called the Etherseries, which allows personal computer users to access, share and store information in a local-area network environment. It is intended for two to 200 users, which means we usually target small to medium-size firms.

"The products are based on Ethernet, the industry standard for 10M bit/sec. transmissions. We feel that's fast enough to meet most users' needs."

Tobes notes 3Com's emphasis has shifted in recent years from hardware to software in an effort to maintain compatibility with protocol standards, such as those developed by the International Standards Organization.

"Last year our primary focus was on the first-time user. But this year we are extending our reach to the software engineers and application developers who serve the users we targeted last year," she explains.

"It turns out that as we move into providing more products, we see ourselves more as software vendors targeting different types of local-area networks, rather than being tied to Ethernet-oriented hardware."

Tobes predicts that personal computer-oriented networks will increasingly be used to integrate office automation and distributed data processing functions, replacing low-end minicomputers.

She describes 3Com's plans to increase its ability to move across different types of networks such as Ethernet, AT&T Starlan, Apple Computer, Inc. Appletalk and token passing ring networks. She notes that 3Com is using networking standards outlined

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Vendor Views

by Microsoft and IBM for third-party software developers.

"The industry is moving more toward this business of giving micro-based networks minicomputer-type functions, such as data base management. We are going to further distribute processing across the networks with products we will be introducing in the next year. The software — the way it is achieving truly distributed processing and power — is going to be the exciting part," she says.

Novell, Inc.
Orem, Utah.

Maxilyn Capell, Novell's manager of public relations, reports, "We announced our Advanced Netware 86 in the spring. It is a high performance networking product based on the Intel [Corp.] 8088 processor." The Advanced Netware 86 product is designed to support the PC Network while adding functionality.

"Since then, we have introduced more products enabling the use of multiple file servers for internetworking dissimilar hardware configurations." One such product is Advanced Netware/PCN, operating system software that supports Netware Bridges for PC Network users. Netware products are installed at 9,000 sites, according to Capell.

Novell has established OEM relationships with various vendors, including Proteon, Inc., Gateway Communications, Inc. and Standard Microsystems Corp. Under those agreements, Novell bundles its Netware operating system with the vendors' hardware.

The bundled products include Netware/S, a star configuration network based on Novell's own hardware, Netware/Pronet based on Proteon hardware, Netware/G Net using Gateway hardware and Netware/Arc Net, using Standard Microsystems hardware. Other third-party vendors have introduced hardware and software products that require the Netware operating system in order to run, extending Novell's penetration even further.

"We want to offer our users flexibility. We feel one configuration doesn't give customers enough options," Capell says. The key to interconnecting dissimilar networks is Novell's software bridge.

Corvus Systems, Inc.
San Jose, Calif.

"Our recent merger with Onyx Systems, Inc. gives us an interesting perspective in terms of not just being big in the personal computer local-area network business but being in the cluster or departmental work group multiuser microcomputer business," says Bill Lanfri, director of marketing for Corvus.

Corvus's premerger networking product, Omninet, has the advantage of twisted-pair wiring, Lanfri says. Many competitors rely on coaxial cable, which is more difficult to install. "We agree with AT&T that twisted-pair technology is the technology for the desktop into the 1990s."

In the first quarter of 1986, Corvus expects to announce the first products resulting from a joint venture with NEC America, Inc. The research is aimed at developing a very large-scale integrated (VLSI) circuit chip to boost Omninet's transfer speed from 1M bit/sec. to 4M bit/sec., "a next-generation type of thing," in Lanfri's words.

But most of Corvus' efforts in the near term will involve the Onyx merger, approved by the companies' boards of directors in July, according to Lanfri. Onyx manufactures 32-bit microcomputers supporting up to 11 users.

"We obviously have an integration task ahead of us," Lanfri explains. "For the next few months, we have to bring the Onyx and Corvus technologies together . . . under the single banner of departmental computing."

Software vendors

Management Science America, Inc. (MSA)
Atlanta, Ga.

"We've had various releases of our Expert Link micro-to-mainframe product since 1983 and have continued to enhance the product throughout that time," notes Larry Smart, MSA's senior vice-president for development.

"We originally came out with a screen-snatching ability, where the microcomputer user could pull down a screen from the mainframe. Later, we added a dictionary-driven function that allows users to define what data they want."

He adds, "Expert Link is a component of our overall Expert product technology. It allows us to download data and upload data. We can download files from the mainframe to the personal computer and upload from the personal computer to specific application systems on the mainframe.

"We also have a comparatively new function — the ability to do personal computer data entry. With that function, the menus and functionality that the users see are normal personal computer screens on an off-line basis. When they are done, they can upload data to the mainframe. They don't have to be hooked up using mainframe cycle time and connections the whole time."

In the coming months, MSA will be enhancing its Information Expert, a "more generalized personal computer link" designed to work in conjunction with non-MSA applications as well as MSA systems.

Other announcements are likely to involve new development agreements with microcomputer software vendors as part of MSA's move toward links that allow software packages such as Lotus Development Corp.'s Symphony and Ashton-Tate's Dbase II and Dbase III to control the Expert Link activity.

Industrywide, Smart anticipates activity will focus on joint ventures between mainframe software houses such as MSA and microcomputer software vendors. Greater emphasis on security and the acceptance of IBM technologies as standards at the physical link level are also in the works, he says.

Cullinet Software, Inc.
Westwood, Mass.

Cullinet produces a micro-to-mainframe link package that includes its mainframe-based Information Center Management System (ICMS) and its micro-based Goldengate program.

"ICMS and Goldengate provide the micro-mainframe link while giving the information center the means to manage information," explains Jack Armstrong, manager of information center product planning. Nobody else has offered a tool that allows the personal computer user to access the mainframe without having the MIS department step in and perform tasks such as abstracting data.

"ICMS are two pieces of software designed to work together," he notes. One almost couldn't work without the other," he adds. "They enable the end user to interact with the host purely through the interface provided by the software. If I am the user, I don't want to have to look at things like a logon screen.

The industry is moving more toward this business of giving micro-based networks minicomputer-type functions . . . The software is going to be the exciting part.

"We want to completely eliminate the need for the user to know anything about the mainframe. For one thing, it means MIS doesn't have to offer additional user training."

He says of the coming six months, "We are basically doing two things. We are generalizing our communications interface so we can support a wider variety of emulation boards and communications protocols. We are trying to keep the data transfer level independent of the software itself.

"We also will be including in Goldengate a reporting facility for more general use with products such as Dbase II, Dbase III, 1-2-3 and Symphony. We will then be able, for example, to have spreadsheets updated by the mainframe whenever needed.

"For instance, to the user working with a production data table, it will look like the data table is on the personal computer, but it actually will be on the mainframe as an extension of the spreadsheet. The user will only have to press the RECALC key to update the spreadsheet," he notes.

Informatics General Corp.
Canoga Park, Calif.

Rich Shapero, director of marketing for the Answer Division of Informatics, reports that one new offering in the Answer line of micro-to-mainframe links is Alpha Link. The package is Informatics' version of Micro Tempest, Inc. Tempest Link.

Shapero says that when paired with Informatics' Answer Personal Reporter, Alpha Link provides almost 30 communications environments with upload and download capabilities previously available only in 3270 environments.

Alpha Link is a data processing department reporting tool that provides improved file transfer and virtual diskette capabilities in conjunction with whatever microcomputer applications are being used. According to Shapero, Alpha Link "fills in" a gap in the micro-to-mainframe product line.

On the micro side, he explains, "Our Micro Answer product line is primarily the end-user tool. It is for someone who is constantly using 1-2-3 or another spreadsheet. What they are after is mainframe data to manipulate. We are saving them keystrokes and integrating the personal computer into the mainframe environment."

Informatics has 700 mainframe installations and 3,000 users running Answer products on microcomputers, according to Shapero.

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Vendor Views

"The next need to be met is moving information through intermediate machines," he says. "We feel an awful lot of people out there are making commitments to intermediate machines, so there certainly is interest in shipping data to and from Vsam systems to HP 3000s and other intermediate machines."

For the industry, there remains the burden of responding to customer needs and demands. Shapero says, "The responses we are getting back from users and DP departments are horrendous. We have major technological hurdles that we must overcome."

Digital Communications Associates, Inc. (DCA) Norcross, Ga.

"The Irma card was the very first of a general series of emulation products for us," reports Robert Zack, director of corporate communications. Irma allows an IBM Personal Computer to attach directly to an IBM 3270 controller.

"It originally was meant to allow you to avoid the hassle of having both a 3270 terminal and a Personal Computer," Zack says. But as it has evolved, it has gone beyond that with functions such as file transfer, and the product line has expanded beyond the card itself."

Examples of the product line growth cited by Zack include Irmaprint and Irmakey. Irmaprint allows a printer attached to a personal computer to emulate an IBM 3287 printer, while Irmakey is a 3270-type keyboard that replaces the personal computer keyboard and allows the user to avoid using combination key-shift commands.

DCA's plans are focused on developing multisession products. "At Comdex/Spring," Zack notes, "we announced Irma X — the second generation of Irma. At the moment, the only announcement we have made is for a graphics product. It does not support multisessions, but we will [soon] be announcing a multisession product which will allow you to have up to four different windows, each one representing a terminal session with the host.

"You would have the effect of four different terminals all on the screen of a personal computer running over a single piece of coaxial cable," Zack points out.

He predicts that the industry of micro-to-mainframe links will focus on IBM's LU6.2 standard, which he says is well defined in IBM's SNA environment but not at the personal computer level. "Anybody who is in the protocol conversion business has got to be looking at and planning for the implementation of LU6.2," he says.

Techland Systems, Inc. New York, N.Y.

Techland Systems features the Blue Lynx line of terminal emulation products. Product Manager Michael Krieger recalls, "We started out a few years ago in the remote communications market and expanded into the direct-attach game by making personal computers look like any type of terminal."

One of the more recent product additions, the Blue Lynx 5251 Model 11, was designed to allow a range of data transfers by emulating an IBM 5251 Model 11 terminal and allowing the personal computer to appear as up to four devices.

Krieger cites the 5251 Model 11 as an example of how memory demands on emulation boards have been reduced. The product's Zilog, Inc. Z80 board uses only 22K bytes of random-access memory (RAM) rather than the 180K-byte RAM used by older competitor boards.

Krieger reports that Techland is preparing to release a 16-terminal 5250 gateway for use in IBM Series/1 and System/38 environments.

The company already sells a gateway product for IBM 3080 series environments, supporting up to 255 personal computers and terminals but with a practical limit of 32 devices.

Of the industry, he notes, "I think you are going to see more emphasis on gateways with one of the personal computers on a network operating as a gateway by emulating an [IBM] 3274 controller."

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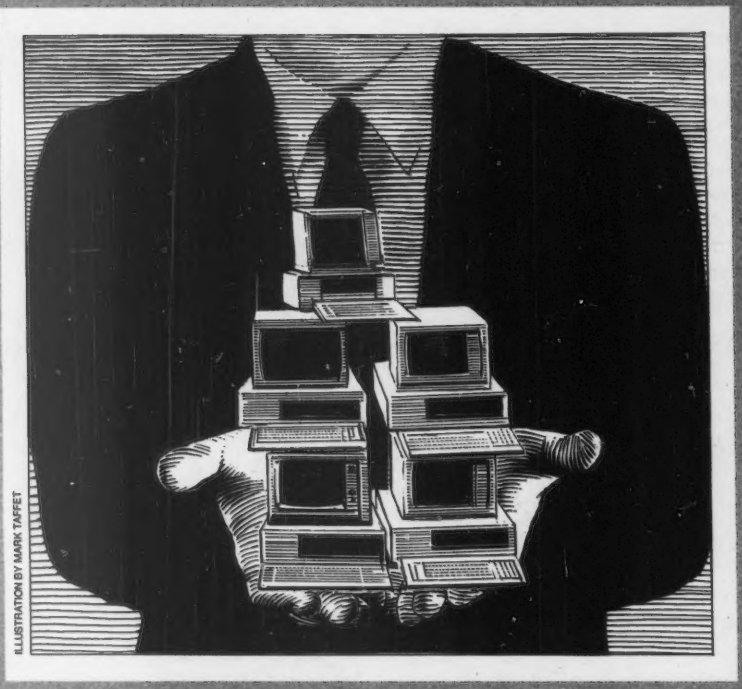

ILLUSTRATION BY MARK TAFFET

They're in the hands of the CIO

By William de Gruchy

A growing number of CIOs dread the day they must replace, displace or take possession of the company's personal computer hardware and software. But someone has to do it.

The widespread use of micros by middle managers is causing problems for the chief information officer. Specifically, how can a CIO control the flow and accuracy of corporate information?

Many CIOs are legitimately concerned about their ability to control personal computing — an area on the fringe of MIS/DP. Conversely, many middle managers — the principal personal computer users — are becoming increasingly protective of their newfound autonomy.

The long-term consequences of the conflict under way are more far-reaching than a struggle over corporate turf might imply. In practical terms, the personal computer revolution in the corporate world has meant a loss of some important checks and balances. Most divisional managers are now

able to input their own data, do their own spreadsheet analyses and make recommendations and decisions based on whatever information they themselves have developed. Managers are able to accomplish all this without any participation or oversight by the company CIO or any other MIS professional.

This revolution has already fostered in some organizations what could be called "creeping chaos." The strict controls over data purity, traditionally exercised by MIS professionals, are not being enforced. Top-level staff meetings can degenerate into arguments over numbers, leaving the decision makers unable to agree on whose data to accept, much less which actions to take.

Crossing over

In a typical scenario, one Fortune 500 CIO authorized the use of specific brands of micros and software for his company's regional offices. Six months later, he admitted to being amazed at what the managers there were doing with their machines.

Like many CIOs, he had presumed his regional managers would use their personal computers as word processors or as a means of storing local report data. Instead, some managers supplemented the official software with a variety of spreadsheet and statistical modeling systems. Others equipped their micros with telecommunications capabilities and were exchanging unedited sales data among themselves, inadvertently crossing over district lines.

The strict controls over data purity, traditionally exercised by MIS professionals, are not being enforced. Top-level staff meetings can degenerate into arguments over numbers.

The complaints of senior MIS professionals are rarely aimed at simply curtailing middle manager initiative. Most often they center on the inaccuracy of data and subsequent analyses. When inexperienced lay people use computers and spreadsheet programs, they often make mistakes, and these errors tend to get compounded along the way.

A leading packaged goods company, investigating discrepancies in a product marketing report, found that the data dictionary cross-reference file — kept on the marketing manager's personal computer — had not been updated in more than two years with new marketing files. "It was as though you were using a 1976 phone directory to find the newest restaurants in town," complained the frustrated head of marketing.

A financial services company found that an internal report included information on a competitor gathered from a variety of outside sources, including projections from brokerage firms, investment newsletters and business publications, none of which the company could verify. The manager responsible had simply input investment information he had received at home.

What lay managers seldom appreciate is that for 20 years information services professionals have developed effective ways of catching errors and verifying data they use. Most middle managers using popular microcomputer packages don't think to use "reasonableness" checks, validity checks or audit trails. A one-tenth of one percent error may not seem significant, but when it is compounded over a six-month period by many end users, it takes on new dimensions.

Dreaded task

Most corporations will soon face the monumental task of reorganizing and consolidating information from personal computers as control returns to central MIS. A growing number of CIOs dread the day when they will be asked to replace, displace or take possession of personal computer hardware and software in their organizations. They may be in the position of unwelcome policemen, enforcing corporatewide choices for approved software packages and vendors. Even straightening out data integrity snafus — clearly in everyone's best interest — can produce conflict as roles change and end users are told they can no longer operate autonomously.

The inevitable task need not be viewed as a battle between the corporate CIO and middle managers. Rather, each side can now take advantage of what the other has learned in the recent past.

Recall the reason for the proliferation of personal computers in the first place: Middle managers had grown impatient with unkept promises made by MIS management. Rather than wait years for proposed microcomputer networks, these managers purchased their own stand-alone micros, often out of their own pockets or departmental budgets.

Needless to say, as end users gained control, they lost a good deal of MIS/DP support. But the personal computer movement took off and non-information systems executives gave it their corporate blessing.

It is naive to think companies can now return to a disciplined, centralized MIS function that operates without the involvement and personal input of those "lay" executives. The solutions can be developed — but only in concert with these end users, who are now much more sophisticated in their understanding of microcomputer capabilities and limitations.

Some suggestions:

- Provide guidelines on authorized software to make it universal among the various personal computers in your organization. Adhere to a standard means of using such software. (Look for products with validity and error checks built in.)
- Gain senior management support, financial and otherwise, to provide middle managers with the training they require, including regular seminars and refresher courses.
- Most of all, include middle managers in decisions relating to systems and software. Their input can be sought in a variety of ways, including surveys and requests for suggestions.

By 1988, microchips will be built with submicron densities capable of internal memories in the 10M- to 30M-byte range, or about 20 times faster than today's models. Companies must get a handle on the data integrity problem today or face the prospect of losing even more control in a few short years.

William de Gruchy is president of The Rand Group, Inc. in Stamford, Conn., a management consulting firm specializing in information management and customized software. He is also chairman of the CIO Roundtable, an association of chief information officers of major corporations.

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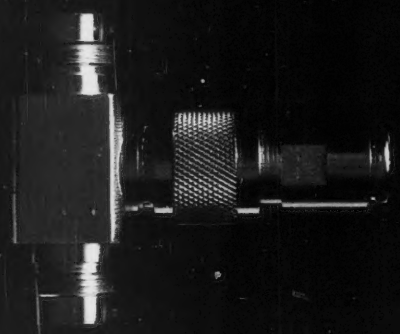

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